Program Special!! Inside

N…HLAND'S PERSONAL COMPUTER MAGAZINE

BITS & BYTES

June 1984: $1.50

Printers under $2000 on the market

Dick Smith's Challenger to IBM

Sord Lap computer

Enlarged Commodore section
- **Regular VIC column**
- **More for the 64**

school computer report

Atari is back! the new Atari 600 and 800XL reviewed

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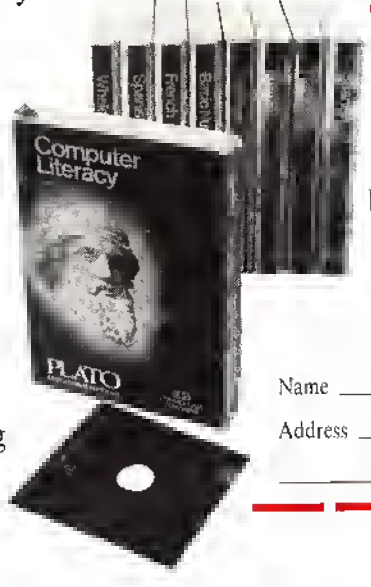

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CONTROL DATA

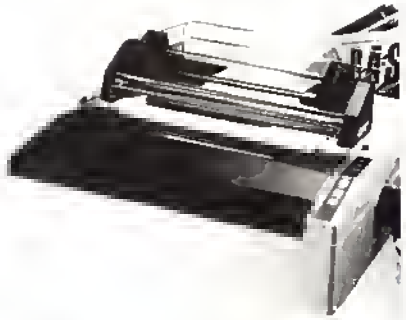
BITS & BYTES

June, 1984 Vol. 2, No. 9 ISSN 0111-9826

FEATURES

COLUMNS

REGULARS



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New BITS & BYTES computer show in Wellington

The first computer show in Wellington dedicated solely to microcomputers is now being organised by BITS & BYTES.

The Wellington Computer Show will be held in the Overseas Terminal from August 31 to September 2 and will cover microcomputers for home, business and educational uses.

Last year BITS & BYTES organised the highly successful Christchurch Computer Show (to be repeated on November 23 and 24 this year) which attracted nearly 6000 visitors in two days.

We are sure many people from Wellington and surrounding areas will also welcome the opportunity for "hands-on" evaluation of popular and newly released microcomputers, peripherals and software. More details will be announced in coming issues.

Any organisation or individual interested in displaying a computer product at the show should contact Marc Heymann, P.O. Box 27-205, Wellington, telephone 844-985 or Paul Crooks, P.O. Box 827, Christchurch, telephone 66-566 for further details.

This month . . .

In this issue BITS & BYTES has continued to expand its coverage of specific computer brands with the addition of a new monthly VIC-20 column (any contributions or queries for this column should be sent to Peter Archer, P.O. Box 860, Nelson) and more for the Commodore 64.

Also featured is another program special covering several different brands. These specials will now be more regular and we welcome program contributions (send to P.O. box 827, Christchurch) from ZX81 to MS-DOS running machines.

Next month . . .

July sees the start proper of our new Atari column plus a series reviewing software for the larger CP/M and MS-DOS computers.

This series will cover popular applications software such as spreadsheets, wordprocessors, data-base managers and the new "window" type programs.

We are sure this series will be of wide interest to many people as these types of software are increasingly becoming available, and used, on more and more computers.

Atari fans!

The Atari reviews featured in this issue are just the start of a regular Atari column which will include hints, software and hardware reviews, programs and so on dedicated to Atari users.

This column is in response to numerous requests from Atari computer users and several have promised to contribute regularly. But we urge all Atari users with original ideas and programs to contribute to ensure its success (past Atari columns have failed because of lack of support).

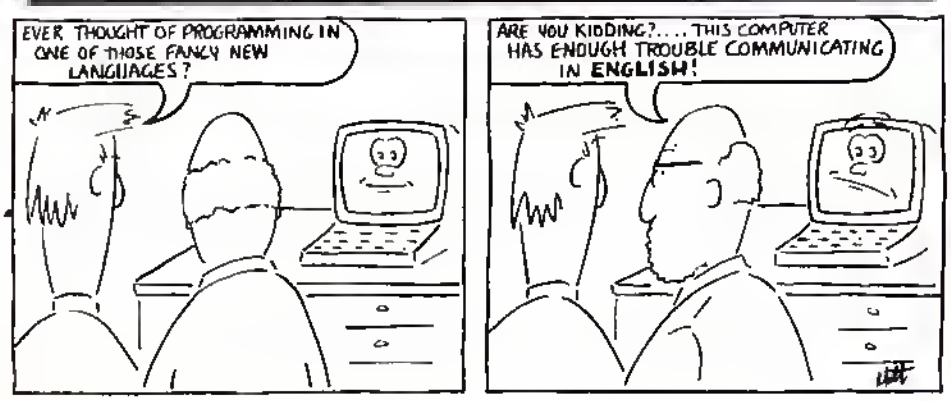
EDITORIAL ASSISTANT

Bits & Bytes would like the help of someone in Christchurch for a few hours a week. The task will be to help in the co-ordination and preparation of program specials and software reviews.

Some technical knowledge would be a help.

Write: Ed. Assistant
Bits & Bytes
Box 827
Christchurch

MICRO MOMENTS — BY MATT KILLIP



Minor Miracle:

Or how Epson got two astonishing printers to occupy the same space. The LQ1500™.

You've never seen anything quite like the new Epson LQ-1500 Business Printer. It switches effortlessly back and forth between draft and letter quality printing on fanfold or single sheet paper. And it does it at a price every office can afford.

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Actual LQ-1500 print sample.

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Please rush me details of your minor miracle – the LQ-1500 printer.

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Apple v Franklin

The New Zealand High Court has brought down a copyright decision that should close the Apple v Franklin dispute in New Zealand. It bars the New Zealand agent for Franklin from infringing Apple operating systems. However, it should not affect Franklin sales in this country. Apple and Franklin have now buried the hatchet in America, following a $US2.5 million out-of-court settlement under which Franklins with Apple cards were allowed still to be sold pending the production of Franklins with their own operating systems (but still Apple compatible). The deadline for the sale of the Franklins with the new operating systems in New Zealand was May 1. This is being met, and the High Court decision was brought down about a week after that. All Franklins being shipped in New Zealand now have the new Franklin operating systems. Franklin is now negotiating with IBM so that it may introduce a machine later this year which will be both IBM and Apple compatible and will run CP/M. Also coming up is a Franklin briefcase model, which should be in New Zealand soon.

Apple dealers

Fifteen Andas (formerly Armstrong and Springhall, Ltd) centres will become authorised Apple dealers. Andas Engineering, Ltd, which has 20 branches and employs about 150 electronics technicians and engineers has been made the official back-up service agent for Apple in New Zealand. The move was jointly announced by the chairman of Andas, Mr K.E.S. Faser, and Mr Mike Lord, general manager of CED Distributors, Ltd, a division of Consolidated Enterprises, Ltd.

Acorn gets to market

Unexpectedly ahead of the second processor, Acorn has got its teletext adaptor and IEEE interface on to the market in Britain. The Teletext adaptor allows the BBC to link in to the broadcast information services offered by the BBC and the independent channels (and now by the Broadcasting Corporation of New Zealand). Its main attraction in Britain is that free software can be loaded down over the air from a constantly refreshed pool provided by the BBC. More generally it can also download factual information and, for instance, access a data base display from which it can abstract the values into its own memory graphing or analysis by its own programs. It is understood that Barsons is looking at the possibility of release of a VHF version in New Zealand in June.

The IEEE interface box gives access to the most common laboratory equipment control network, the IEEE-488 bus, the standard originally established as the Hewlett-Packard interface bus (HPIB). With this up to 14 independent laboratory devices or peripherals can be controlled simultaneously. It appears that the interface, which operates from a separate box plus using an additional ROM in the BBC machine, will work in the background for many tasks. The IEEE interface in Britain is marketed at roughly $750 and the Teletext adaptor at roughly $450.

. . . and gets silly

As a result of a High Court injunction, the magazine, *Personal Computer World*, has paid $150,000 in an out-of-court settlement to Acorn Computers. The payment is in response to aninjunctionby Acorn as a result of an article that showed Acorn users how to transfer their existing tape-based Acornsoft programs to disks for more convenient use. Acorn claimed this was piracy. To get its January issue out the magazine settled out of court, leaving the legal point unresolved.

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More on the QL

The Sinclair QL ("Quantum Leap") specifications are now available in greater detail. The chip used is the Motorola 68008, a 68000 with an 8-bit data bus. It runs at 7.5 MHz with a 1 megabyte linear addressing capability. It has 32K ROM and expansion to 640K RAM with twin microdrives built in to one end of the machine. Display is up to 85 characters by 25 lines with graphics in four colours at 512 x 256 or 8 at 256 x 256. Built-in software includes a structured basic with full screen editor and a multi-task (time sliced), multi-window operating environment. Although well set up for ports (TV, RGB, 2x RS232, 2x joysticks, 2x LANs, memory expansion sockets) it has no interface for a standard disk drive. The price of about $1000 is tax inclusive in Britain. It weighs 3lb and measures 472mm by 138mm by 46mm.

The first of the QL's have been delivered. Announced in January with the promise of a 30-day delivery, the first of the machines were shipped to customers in mid-April, when there was a backlog of 13,000 orders. A last-minute technical hitch was the cause of the delay. It was found that the machine's operating system was too large to fit the chip built for it. An additional chip had to be added, and on early models at least, its housing juts out from the rear of the computer case.

Cat and Challenger launch

Both of Dick Smith's new computers, the IBM PC compatible Challenger and the Apple compatible Cat, will be launched in Auckland this month.

The Challenger is reviewed in this month's issue and next month we will feature the Cat.

Mac in Britain

Presumably with a rather grey image, but one fitting to the British climate, the Macintosh has been released in Britain with a price around $3600. This puts it below the IBM-PC and just above the ACT Apricot in that market. The interpretive structured BASIC and Pascal released there look attractive. Advance publicity material shows program development using multiple windows: one for graphics, one for text output, and one with a program listing with the currently active statement constantly highlighted as the program executes. Selling well in the United States, it will be interesting to monitor progress in Britain.

Price reductions start again

Last month's 40 per cent drop in the price of 16K Spectrum computers by David Reid Electronics has triggered another round of price cuts by competitors.

The prices of both 16K and 48K Spectrums were reduced $200 by Reids (to $299 and $499 respectively).

Commodore Computers responded by cutting the price of the VIC-20 by $100 to $399 and Dick Smith Electronics in turn has dropped the price of the VZ-200 by $100 to $199.

The original move by David Reid Electronics was believed in part to be aimed at hitting the independent importers who have been undercutting the national agents in recent months.

The price moves do raise a question mark over the price and future of the Sinclair ZX81 here. Some special prices on this computer are expected in the next few months as stocks are cleared.

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"Take a long hard look at Dick Smith's VZ-200 . . . it's a very good buy indeed . . . it has a lot of capabilities (including colour and sound) for an astonishingly low price. In particular, it's an excellent introduction to the world of computers."
– The Grapevine, February, 1984.

NZ102/LL

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MICRO NEWS

Bid for education

Competition for a share of the education market continues to hot up with a number of companies offering special come-ons and deals to win the educationalists over.

Imagineering, the New Zealand agent for Micropro International Corp, hosted Dean Scott, Micropro's senior marketing manager from California, in Auckland last month while he announced new strategy aimed at putting Micropro into New Zealand educational institutes.

Software programs and computer peripherals were being offered at "very affordable prices", according to Imagineering's general manager, Paul Dixon, who said training centres would be offered up to 90 per cent off the retail price on Mircopro and other products.

Micropro has a philosophy of developing software which those who lack programming experience can use — particularly in the business environment.

To enhance its Wordstar word processing software, Micropro has released the Wordstar Professional, a package which includes an integrated set of programs including:

• Mailmerge — an enhancement for Wordstar allowing the user to develop computerised mailing lists for personal and volume mailings;

• Correctstar — a spelling corrector which verifies typing and spelling errors and automatically suggests corrections. It has a 65,000 word dictionary.

• Spellstar — verifies spellings and typographical errors with an electronic dictionary. Star index means the user can generate customised indexes and table of contents.

• Wordstar tutor — six lessons aimed at taking the user from simple word procesing functions to the more sophisticated Wordstar capabilities. Purchasers of Wordstar receive Wordstar Tutor free and existing Wordstar users can upgrade to the new professional package for half price.

Novell Sharenet

AWA recently announced the local introduction of the Novell Sharenet product.

Novell NetWare is a family of microcomputer local network products, all using the Netware Operating System, which links micros, micro operating systems, network communications, mass storage devices, peripherals and software applications. Operating systems, utilities and applications functioning with one NetWare product will operate with other NetWare configurations. Major micro operating systems – PC-DOS 1.1, PC-DOS 2.0, CP/M-80, CP/M-86 and the UCDSD p-System – are supported and a Unix implementation will also be available.

Watch out for CIA

The JADE software package, developed by Computer Intelligence Applications, is being assessed by IBM, in the USA for inclusion in its world-wide range.

JADE, developed here three years ago by CIA, is a job cost system well suited to electricians, plumbers, builders and other small to medium-sized businesses.

So far, the company has done 70 installations — 60 in New Zealand and 10 in Australia — in companies with staffs ranging from one to 60.

Based on MS DOS the software will run on any IBM compatible machine or machines which run MS DOS. The package includes five systems — job costing, bill of materials, invoicing, debtors ledger, price book and inventory file — and costs $2600 all up.

Managing director, Barry Sexton says the price compares well. But more importantly, he believes the professional approach to packaging has been instrumental in gaining overseas attention.

C64 top of the pops

Commodore 64 has been awarded the "Home Computer of the Year" title in a series of popularity polls conducted by computer magazines in Europe and the USA.

The polls were conducted by the six magazines among their readerships, and staff and machines entering the poll were required to offer a usable, fully addressed system which was available on the market. There also had to be software for entries, and the system has to be proved through use.

Commodore 64's powerful sound facilities and wide range of software, including word processors, some serious business packages and selection of games, were the factors which took the machine to a clean win.

New Club

The Wellington Apple Users Club inaugural meeting recently attracted users from as far afield as Levin. The club expects to have a membership of 90 by December. Other clubs may be interested in the fees set: $100 "corporate", $20 family, $15 individual, and $10 student.

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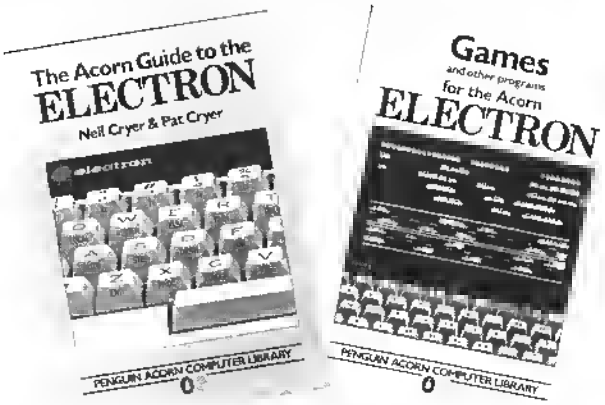

Published with the full co-operation of the manufacturers, these guides explain everything an Acorn owner needs to know

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PRINTER ROUND-UP: No. 2

Introduction: What to look for

Since my original brief dot-matrix printer summary printed in the December, 1983, edition of Bits and Bytes there has not been a lot of change in the New Zealand printer market. A few new entries appear, and I have dropped a few that don't appear to be actively marketed in the country. Additions include the full Star range, Riteman, Olivetti PR2300 and Hewlett Packard ink-jet printers, and the just released, high-performance Epson LQ-1500. – S.D.

By Shayne Doyle

A reasonable-quality printer sporting most of the usual features will still cost you between $700 and $1500. Some of these may be common print units wearing different clothes. When choosing a printer for home use, running costs may be a consideration, especially if operating on a limited computing budget.

There are a couple of areas to watch here to conserve running costs. First, consider the type of ribbon the printer requires: some units still use the good old standard 2in Underwood-style typewriter ribbons available everywhere for between $3 and $7. Most printers seem to favour the endless cassette type of ribbon; this enables the manufacturer to eliminate ribbon direction change mechanisms but you pay for that in the end as average cassette ribbon costs are around $15 to $30. Should you buy a printer using 2in spools, make sure when you put on a replacement typewriter ribbon that the eyelets at each end of the ribbon will catch the direction change forks and trip the mechanism.

Second, feeding the beastie can be very expensive. A4 page, 10in wide fanfold paper typically costs $25 to $45 per 1000 sheets. Profligate listing of program sources and test print-outs can chew through 1000 sheets very quickly.

All of the printers have friction feed, and some offer roll holders as standard. A 10in wide roll of white paper is quite cheap at about $2.50.

Be aware of the difference between "sprocket" or "pin feed" and true tractor-feed units. The former is not removable from the printer and the sprockets may interfere with single sheet feeding. Also watch out for printers with fixed-width pin feed as part of the roller. These restrict you to a single width paper and may prevent you from using any other widths of paper you may acquire. True tractor feeders are removable and are usually gear driven from the roller drive. They are usually more robust than the cheaper sprocket feeds.

Printer jargon

Some of the other printer parameters should also be explained. "Dot matrix" refers to the construction of the actual printing head elements: a square matrix of fine wire pins each with a driving solenoid that strikes the pin against the ribbon and on to the paper to create a pattern of dots. The character-generator ROM in the printer determines the pattern of pins activated and therefore the correct character as shown in figure 1. The usual configuration is nine vertical pins and nine horizontal. Some have less, some more horizontal pins. More pins equals better formed characters, and some quite ingenious arrangements have been devised to produce higher dot densities with a limited pin configuration.

Some machines offer "correspondence" or "near letter" quality printing by two or more overpasses, off-setting the head slightly each pass. This can produce very good results — at a loss of speed of course.

"Bidirectional" means that the unit prints when the head is moving left to right or right to left and "logic seeking" means the head control microprocessor will work out the shortest distance to travel to start the next line. It is also worth remembering that the quoted speed, e.g., 120 characters per second, will only be relevant to the normal draft mode; other features such as emphasised and compressed print modes reduce this speed considerably.

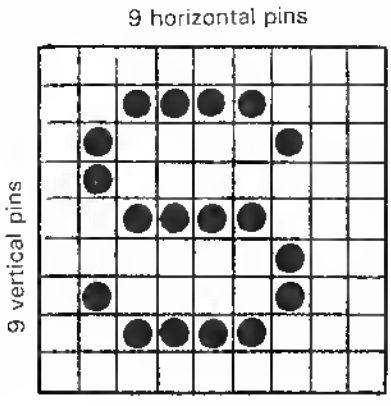
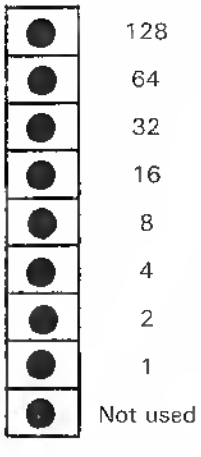


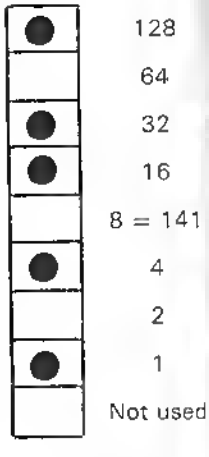
Figure 1

Figure 2a



Vertical pin/data bit equivalence

Figure 2b



Example of pins "fired" on receipt of value 141

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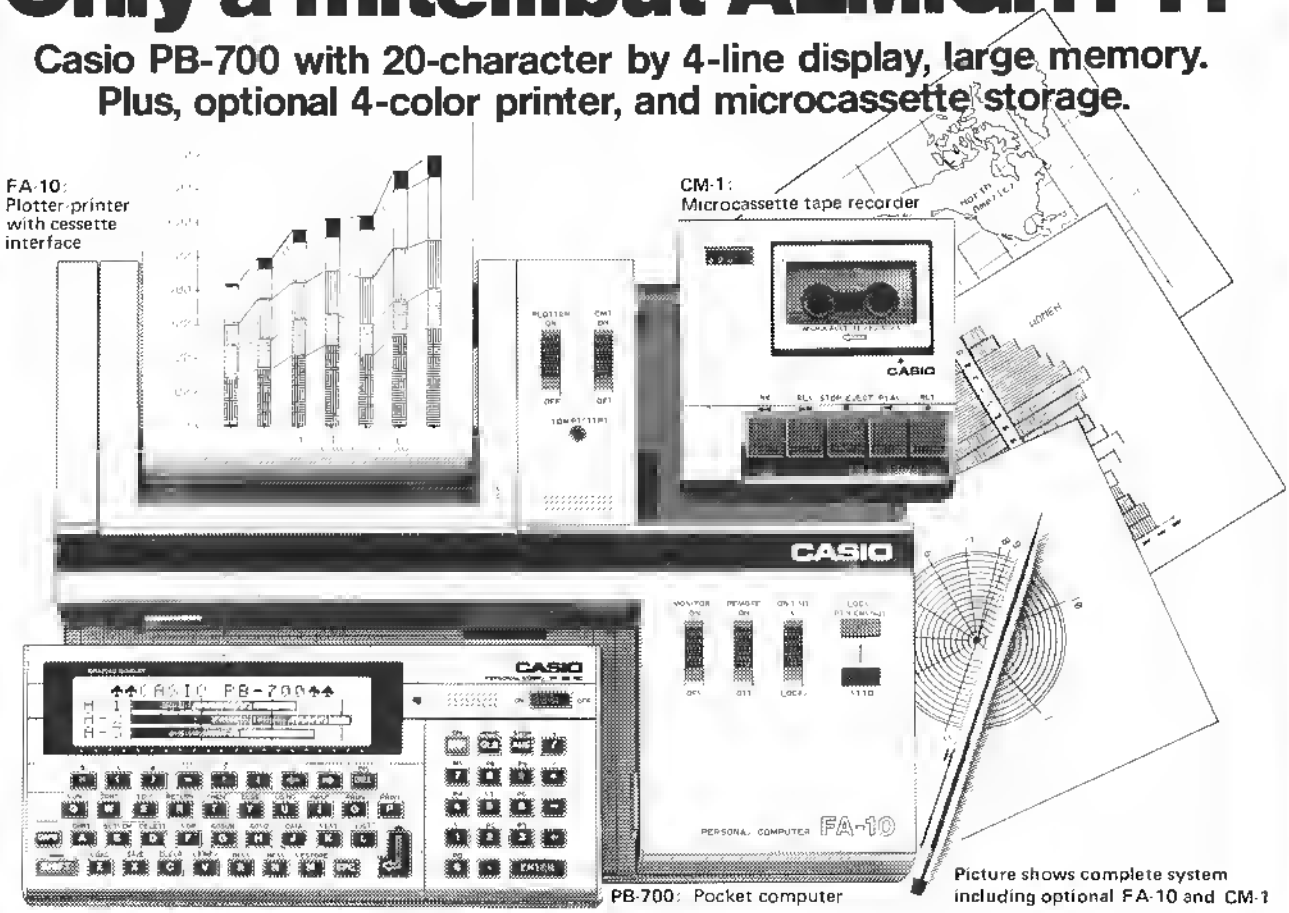
Only a mite...but ALMIGHTY!

Casio PB-700 with 20-character by 4-line display, large memory. Plus, optional 4-color printer, and microcassette storage.



PB-700: Pocket computer

Picture shows complete system including optional FA-10 and CM-1

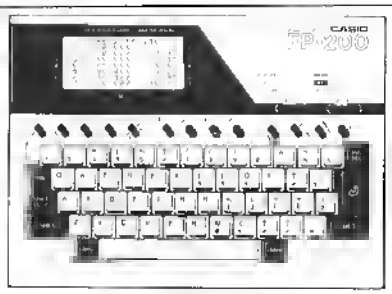
Wide, 20-character by 4-line display, lets you put graphics with ease.
Casio introduces the first large-size liquid crystal display for pocket computers. 20 characters by 4 lines, 160 × 32 dots. And high resolution. Make graphs, graphic characters, etc. Do virtually anything you can imagine.

Optional 4-color mini plotter-printer features 114 mm wide paper roll.

Top among pocket computers.
Now get easy to read material. And 4-color capacity can make any graph possible.

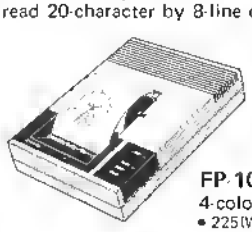
Pocket size, yet up to 16KB RAM memory!
In standard configuration, PB-700 has about 25KB of ROM and 4KB of RAM. Add up to three more RAM packs (OR-4, option), and the RAM capacity jumps to about 16KB.

- High-precision decimal calculation • Multiple functions
- Convenient one-key commands • Maximum of 10 program areas • Independent 10-key calculator
- 2 beepers • Program/data save function

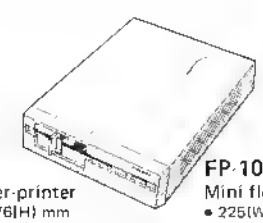


CASIO FP-200
Handy Personal Computer
• 310(W) × 220(D) × 55.5(H) mm

Now with more and better functions. And it is completely portable.
Light and portable, it features a unique CETL (Casio Easy Table Language) that gives you spreed sheet progremming without computer knowledge. Easy to read 20-character by 8-line display. 8KB RAM expandable to 32KB, 32KB ROM to 40KB. Optional peripherals let you build a system to meet your unique needs.



FP-1011PL
4-color mini plotter-printer
• 225(W) × 310(D) × 76(H) mm



FP-1021FD1
Mini floppy disk drive
• 225(W) × 310(D) × 76(H) mm

MONTEK | CASIO®

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ADDRESS _____
_____
Mail to: Montek Equipment Ltd, P.O. Box 78-118, Auckland

'Bit-image' graphics

Most of these printers offer high-resolution, ''bit image'' graphics printing. This is where the head outputs a single vertical row of dots in response to receiving a single byte of data. Each vertical pin represents an increasing binary value as shown in figure 2a. The programmer can control which pins ''fire'' by sending the appropriate data bytes down. For example, to fire pins 1/3/5/6/8 we must PRINT CHR$(181) as shown in figure 2b. As there are nine pins vertically, and we use an 8-bit byte, one pin is left out and we must decrease the line-feed spacing to generate solid block images, usually 7/72in is sufficient.

This left out pin is the cause of imcompatibility between graphics on different models. Epson emulating printers omit the bottom pin while the opposite camp leaves out the top pin. You can try it on paper and see what difference it makes sending the same data byte to each configuration. This type of bit map graphics work can take an awful lot of work to set up if you don't have the software to do it for you.

Graphics densities vary widely. Commonly, 480 and 960 dots per line are termed low and high resolution. Some printers offer a choice of five or six densities up to ultra-high resolution of 1920 dots per line. Block graphics characters can still be found in the character sets of some printers and these can be most useful for certain jobs.

Standard character density is 10 characters per inch, and over an 8in head travel, this gives the familiar 80 characters per line. Printing at higher densities (compressed mode) enables more narrower characters to be printed on the same line. Printing at 13.6 c.p.i. for example, gives 136 characters. More expensive machines with wider carriages will offer 136 characters as standard and 233 in compressed mode — ideal for printing large spreadsheet models.

Interfacing can add dollars to your printer costs. Most units offer only the Centronics parallel interface as standard, and if your computer has only an RS232 printer port then the optional interface can cost up to $350 extra. Some RS232C interfaces will also ''talk'' to a 20mA current loop as well. A few manufacturers offer optional IEEE 488 parallel interfaces. Two examples of computers using this are Hewlett Packard and Commodore.

Additional facilities offered by dot-matrix printers include the capability to print subscripts and superscripts, italics, expanded width characters, different fonts, double-strike mode where each character is struck twice, emphasised mode where the character is reprinted slightly offset, proportional character spacing and continuous underlining where the bottom ninth pin is used to form the underline as the character is printed. Comprehensive line feed, forms control, horizontal and vertical tabbing, and margin control features may also be included. Not all printers have all these and you should check the specification sheet and user manual to make sure the printer you are considering offers the features you need.

One final feature needs explanation: the term, ''down loading character set''. This enables the programmer to design customised graphics or alphanumeric characters and send them from the computer to the printer, where they are stored in a RAM area. You may also have the choice of copying the standard character set into the download character RAM before overwriting specific locations with the custom characters. You may then select either the download or standard set to print with.

PRINTER ROUND-UP

Some of these facilities can be combined to produce other effects and the bottom of figure 3 shows what I call ''microprinting'' from a Star Gemini 10X. This is a combination of Elite font, 7/72in line feed, and condensed mode. I consider this printer the best value for money buy around today: it offers all the previously mentioned features plus friction, tractor and roll paper feed, for a very reasonable price.

All of these features make the current dot-matrix printer a very versatile peripheral, and if you can afford to spend the time at it, they can be made to produce the most amazing results. Don't buy until you try. Unless you are a ''hardware hacker,'' insist on seeing the printer working on your computer before you part with your hard-earned cash.

I have slipped in two or three daisywheel printers, although these will be the subject of their own article in a later issue of *Bits & Bytes*. Also included are a thermal printer and an ink-jet unit. Both are still dot-matrix, the former using heating elements in the head to colour the specially treated paper and produce visible dots, the latter firing a fine jet of ink drops on to the paper, their final positions being controlled by electrostatic spark discharge. Both are non-impact techniques and are therefore very quiet in operation.

PRINTER ROUND-UP

STANDARD DRAFT MODE 10 cpi PICA FONT
Standard draft mode 10 cpi pica font
ENLARGED DRAFT 10 cpi
Enlarged draft 10 cpi
CONDENSED DRAFT MODE 17 cpi PICA FONT
Condensed draft mode 17 cpi pica font
ENLARGED CONDENSED DRAFT 17 cpi PICA
Enlarged condensed draft 17 cpi pica
DOUBLE-STRIKE DRAFT 10 cpi
Double-strike draft 10 cpi
CONDENSED DOUBLE-STRIKE DRAFT 10 cpi
EMPHASISED DRAFT 10 cpi
Emphasised draft 10 cpi
CONDENSED EMPHASISED DRAFT 10 cpi
UNDERLINED DRAFT 10 cpi MODE
THE FOLLOWING IS PRINTED IN SUPERSCRIPT MODE
THE FOLLOWING IS PRINTED IN SUBSCRIPT MODE
DRAFT MODE 10 cpi IN ITALICS
Draft mode 10 cpi in italics

STANDARD DRAFT MODE 12 cpi ELITE FONT
Standard draft mode 12 cpi elite font
ENLARGED DRAFT 12 cpi ELITE
Enlarged draft 12 cpi elite
CONDENSED DRAFT MODE 17 cpi ELITE FONT
Condensed draft mode 17 cpi elite font
ENLARGED CONDENSED DRAFT 17 cpi ELITE
Enlarged condensed draft 17 cpi elite
DOUBLE-STRIKE DRAFT 12 cpi
Double-strike draft 12 cpi
CONDENSED DOUBLE-STRIKE DRAFT 12 cpi
EMPHASISED DRAFT 12 cpi
Emphasised draft 12 cpi
CONDENSED EMPHASISED DRAFT 12 cpi
UNDERLINED DRAFT 12 cpi MODE
THE FOLLOWING IS PRINTED IN SUPERSCRIPT MODE
THE FOLLOWING IS PRINTED IN SUBSCRIPT MODE
DRAFT MODE 12 cpi IN ITALICS
Draft mode 12 cpi in italics

THIS IS A SAMPLE OF GEMINI 10X MICROPRINTING
IT IS STILL AMAZINGLY LEGIBLE EVEN AT THIS SIZE

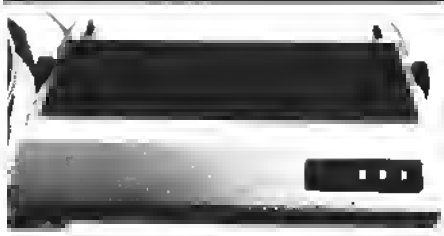
Figure 3
A typical range of print styles from a current-model, dot-matrix printer.

Printer name:	Amust 80DT
Printer type:	Dot-matrix, bidirectional, logic seeking
Print speed:	80 cps
Head format:	9x7 dots
Graphics modes:	640/1280 dots per line
Std chars/line:	80
Max chars/line:	136
Paper feed:	Friction/sprocket
Max paper width:	10in
Std interface:	Centronics parallel
Ribbon type:	Cartridge
Options:	RS232C interface $251 IEEE 488 interface
Cost:	$800
Agent:	AWA (NZ), Ltd

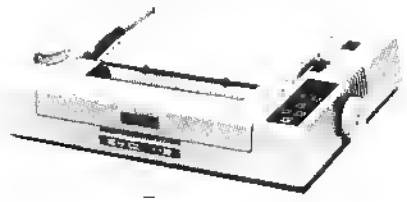
Printer name:	Brother HR-15
Pinter type:	Daisywheel
Print speed:	13 cps
Head format:	96 character, exchangeable daisywheel

Graphics modes: No
Std chars/line: 110
Max chars/line: 165
Paper feed: Friction
Max paper width: 13.5in
Std interface: Centronics parallel
Buffer size: 2K
Ribbon type: Cartridge
Options: RS232C interface — $325
Sheet feeder — $579
Keyboard unit — $420
Features: Superscript/subscript /underlining modes
Proportional spacing mode
Multi copy from buffer facility
Red and black ribbons
Cost: $1895
Agent: Brother Distributors

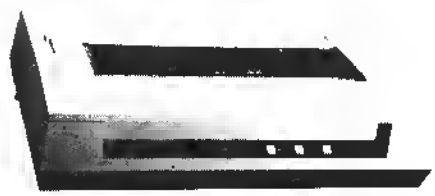
PRINTER ROUND-UP



Printer name: C. Itoh A10
Printer type: Daisywheel
Print speed: 20 cps
Head format: 100 character exchangeable daisywheel
Graphics modes: No
Std chars/line: 115
Max chars/line: 138
Paper feed: Friction
Max paper width: 13in
Std interface: Centronics parallel or RS232C
Buffer size: 2K
Ribbon type: Cartridge
Options: Tractor feed unit — $330
Features: Down loading character set
Cost: $2150
Agent: Control Microcomputers



Printer name: C. Itoh CX-4800
Printer type: Printer-plotter
Print speed: 8 cps
Head format: Auto-change pen (4 colours)
Graphics modes: X-Y axis plotting dots per line
Std chars/line: 80
Paper feed: Sprocket
Max paper width: 9.5in
Std interface: Centronics parallel
Features: Self-test mode
Cost: $1695
Agent: Control Microcomputers



Printer name: C. Itoh 1550S
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 180 cps
Head format: 9x9 dots
Graphics modes: 144/160 dots per inch
Std chars/line: 132
Max chars/line: 230
Paper feed: Friction/tractor
Max paper width: 13.5in
Std interface: Parallel/RS232C/ 20mA current loop
Buffer size: 2K
Ribbon type: Cartridge
Options: RS232C interface — $100
Colour version (parallel) — $200
Colour version (RS232C) — $300
Features: 256 byte overflow buffer
Down loading character sets
Superscript/subscript /italics modes
Programmers hex dump mode
Cost: $2270
Agent: Control Microcomputers

Printer name: C. Itoh 8510S
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 180 cps
Head format: 9x9 dots
Std chars/line: 80
Max chars/line: 132
Paper feed: Friction/tractor
Max paper width: 8in
Std interface: Centronics parallel
Buffer size: 3K
Ribbon type: Cartridge
Options: RS232C interface — $100
Colour version (parallel) — $200
Colour version (RS232C) — $300
Features: 256 byte overflow buffer
Down loading character sets
Superscript/subscript /italics modes
Programmers hex dump mode
Cost: $1695
Agent: Control Microcomputers

Printer name: Canon A-1200
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 120 cps
Head format: 9x9 dots
Graphics modes: 480/960 dots per line

Why should choosing your new printer be such a puzzle?

(When the only clue you need is 5 Across).

ACROSS

1. 80 characters per second. Unidirectional printer. 80 columns or 132 columns condensed.
3. 160 cps Bidirectional 136 column.
4. 350 cps Bidirectional 136 column 2 colour with wide interface ability.
5. Excellent N.Z. Co. supplying wide range of outstanding quality printers with full guarantees and back-up services.
7. Versatile printer. Draft and memo quality. Graphics and colour. Varied character sets for international application.

DOWN

1. 160 cps Bidirectional 80 column. Dual interfaces.
2. 350 cps Bidirectional 136 column. Two colour. Technology intensive.
5. Graphic Printer. Compact. Lightweight. Multi-function character. High level 80 column. Dot Matrix.
6. High quality serial printer. Interchangeable Daisy Print Wheels. Maximum 80 cps.

AWA KNOW PRINTERS INSIDE OUT (and across and down)

which isn't surprising because AWA are agents for some of the most outstanding brands in the printing world; names like OKI, AMUST and LEAR SIEGLER. AWA is aware that there is no one printer for all jobs, that each situation requires a particular type of machine, so AWA are expert in assessing your needs and providing the appropriate printer to meet them. AWA guarantee their products and provide a speedy, country-wide back-up service. So don't let your choice of printer become a puzzle. Get in touch with AWA. They'll give you all the answers in print. The correct ones.

For further details write to:

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Ph. 851-279

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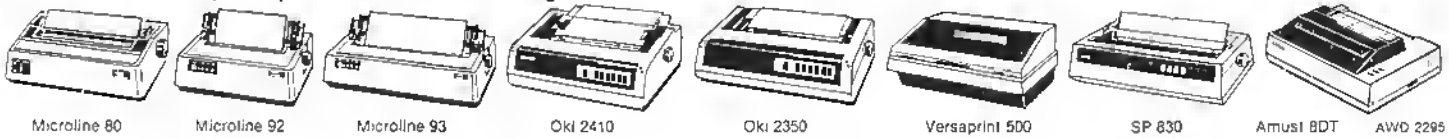
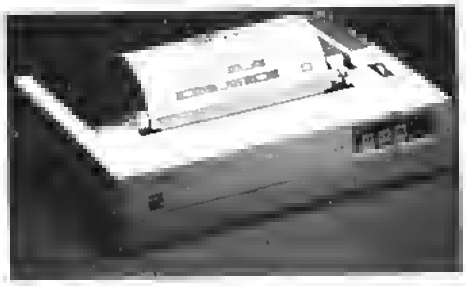
Ph. 890-449

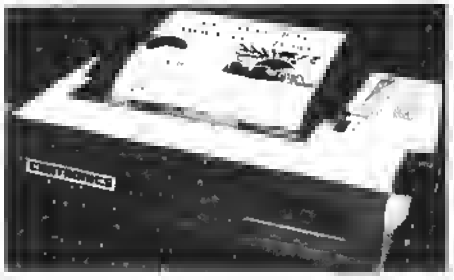


PRINTER ROUND-UP

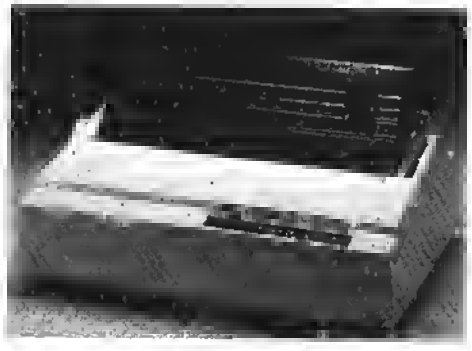
Std chars/line: 80
Max chars/line: 136
Paper feed: Friction/sprocket
Max paper width: 10in
Std interface: Centronics parallel
Buffer size: 1 line
Ribbon type: Cartridge
Cost: $1794
Agent: Kerridge Odeon



Printer name: Canon A-1210
Pinter type: Drop on demand ink-jet
Print speed: 40 cps
Head format: Piezoelectric — 4 horizontal nozzles
Graphics modes: 560/640 dots per line
Std chars/line: 80
Max chars/line: 80
Paper feed: Friction
Max paper width: 8.5in
Std interface: Centronics parallel
Buffer size: 1 line
Ribbon type: Dual cassette ink — black and tricolour
Features: 7 colour plain paperprinting
Low noise level
CRT hard copy function
Cost: $2178
Agent: Kerridge Odeon



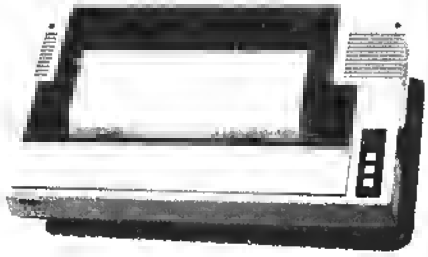
Printer name: Centronics Horizon 80
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 140 cps
Head format: 11x9 dots
Graphics modes: Single/double/ quadruple density dots per line
Std chars/line: 80
Max chars/line: 132
Paper feed: Friction and tractor
Max paper width: 10in
Std interface: Centronics parallel
Ribbon type: Cartridge
Options: RS232C interface
Features: Down loading character set
27 cps near letter-quality print
Subscript/superscript /underlining modes
Incremental (typewriter) mode
Cost: $1600
Agent: STC, Ltd



Printer name: Epson DX-100
Printer type: Daisywheel
Print speed: 13 cps
Head format: 96 character, exchangeable daisywheel
Graphics modes: No
Std chars/line: 110
Max chars/line: 165
Paper feed: Friction
Max. paper width: 13.5in
Std interface: Centronics parallel or RS232C
Buffer size: 5K
Ribbon type: Cartridge
Options: Sheet feeder unit — $722
Keyboard unit — $602
Tractor feed unit — $308
Features: Superscript/subscript/ underlining modes
Proportional spacing mode
Reprint text from buffer facility
Cost: $1933
Agent: Microprocessor Developments, Ltd

Comments: Epson's version of the Brother HR-15 buffer increased to 5K bytes and ROMs made Epson compatible.

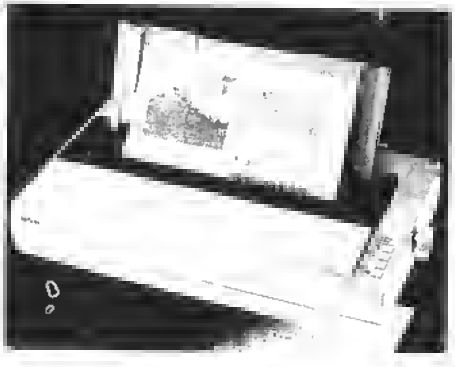
Printer name: Epson FX-80
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 160 cps
Head format: 9x9 dots
Graphics modes: 480/576/640/720/ 960/1920 dots per line
Std chars/line: 80
Max chars/line: 137
Paper feed: Friction/sprocket
Max paper width: 10in
Std interface: Centronics parallel
Buffer size: 3K
Ribbon type: Cartridge
Options: RS232C interface
Features: Superscript/subscript /italics modes
Proportional printing
Down loading character set
Cost: $1799
Agent: Microprocessor Developments, Ltd



Printer name: Epson FX-100
Printer type: Dot matrix bidirectional, logic seeking
Print speed: 160 cps
Head format: 9x9 dots
Graphics modes: 480/640/720/ 960/1920 dots per line
Std chars/line: 136

PRINTER ROUND-UP

Max chars/line: 233
Paper feed: Friction/tractor
Max. paper width: 16in
Std interface: Centronics parallel
Buffer size: 3K
Ribbon type: Cartridge
Options: RS232C & IEEE 488 interfaces
Features: Emphasised/ double-strike/ italics modes
Underline/ superscript/ subscript modes
Electrical Vertical Feeding Unit (EVFU)
Down loading character set
Cost: $2410
Agent: Microprocessor Developments, Ltd



Printer name: Epson LQ-1500
Printer type: Dot matrix, bidirectional, logic seeking
Print speed: 200 cps
Head format: 17x24 dots
Graphics modes: 9 ranges from 816x8 to 2448x24 dots per line
Std chars/line: 136
Max chars/line: 272
Paper feed: Friction
Max. paper width: 16in
Std interface: Centronics parallel/RS232C/ IEEE 488/20mA current loop
Buffer size: 2K
Ribbon type: Cartridge
Options: Tractor feed unit
Single-bin cut sheet feeder
Double-bin cut sheet feeder
Features: Daisywheel quality print at 67 cps
16 additional fonts in multifont option
Download character set
Every standard dot-matrix featuprint mode
Pull-out configuration drawer for easy access
Cost: $4553
Agent: Microprocessor Developments, Ltd

Printer name: Epson RX-80
Printer type: Dot matrix bidirectional, logic seeking
Print speed: 100 cps
Head format: 9x9 dots
Graphics modes: 480/640/720/ 960/1920 dots per line
Std chars/line: 80
Max chars/line: 137
Paper feed: Sprocket
Max. paper width: 10in
Std interface: Centronics parallel
Buffer size: 1 line
Ribbon type: Cartridge
Options: RS232C & IEEE 488 interfaces
Features: Emphasised/ double-strike/ italics modes
superscript/ subscript modes
Cost: $1151
Agent: Microprocessor Developments, Ltd

Printer name: Epson RX-80 F/T
Printer type: Dot matrix, bidirectional, logic seeking
Print speed: 100 cps
Head format: 9x9 dots
Graphics modes: 480/640/720/ 960/1920 dots per line
Std chars/line: 80
Max chars/line: 137
Paper feed: Friction/tractor
Max. paper width 10in
Std interface: Centronics parallel
Buffer size: 1 line
Ribbon type: Cartridge
Options: RS232C and IEEE 488 interfaces
Roll paper holder
Features: Emphasised/ double-strike/ italics modes
superscript/ subscript modes
Cost: $1272
Agent: Microprocessor Developments, Ltd

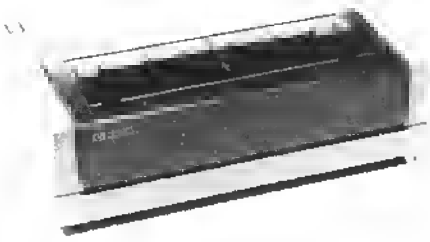
Printer name: Epson RX-100
Printer type: Dot matrix, bidirectional, logic seeking
Print speed: 100 cps
Head format: 9x9 dots
Graphics modes: 480/640/720/ 960/1920 dots per line
Std chars/line: 136
Max chars/line: 233
Paper feed: Friction/tractor
Max. paper width: 15.5in
Std interface: Centronics parallel
Buffer size: 1 line
Ribbon type: Cartridge
Options: RS232C & IEEE 488 interfaces
Features: Emphasised/ double-strike/ italics modes
underline/ superscript/ subscript modes
Electrical Vertical Feeding Unit (EVFU)
Cost: $1895
Agent: Microprocessor Developments, Ltd

Printer name: Facit 4510
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 120 cps
Head format: 9x9 dots
Graphics modes: Yes; bit-image and block graphics
Std chars/line: 80

PRINTER ROUND-UP

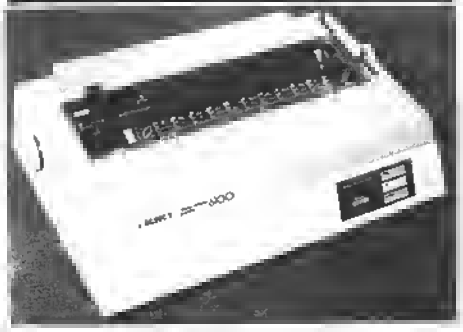
Max chars/line: 80
Paper feed: Friction/tractor
Max. paper width: 10in
Std interface: Parallel and serial
Buffer size: 2K
Ribbon Type: Cartridge
Cost: $1743
Agent: McLean Information Technology

Printer name: Facit 4512
Printer type: Dot matrix, bidirectional, logic seeking
Print speed: 140 cps
Head format: 9x9 dots
Graphics modes: Yes; bit-image and block graphics
Std chars/line: 132
Max chars/line: 132
Paper feed: Friction/tractor
Max. paper width: 15in
Std interface: Parallel and Serial
Buffer size: 2K
Ribbon type: Cartridge
Cost: $2513
Agent: McLean Information Technology

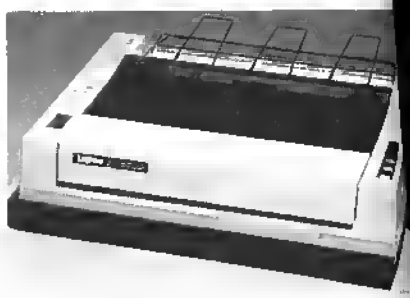


Printer name: Hewlett Packard HP 2225
Printer type: Ink-jet printer
Print speed: 150 cps
Head format: 11x12
Graphics modes: 96 or 192 dots per inch
Std chars/line: 80
Max chars/line: 142
Paper feed: Friction and tractor
Max paper width: 8.5in
Std interface: Centronics and Hewlett Packard HPIB
Ribbon type: Exchangeable ink cartridge
Options: Acrylic printer stand
Battery powered portable version — HP2225B
Features: Quiet, non-impact printing
4 print pitches/printable control codes
Underline and bold face modes
Up to 200 A4 pages on 1 charge (HP2225B)
Disposable ink-jet print head system
Cost: $900
Agent: Hewlett Packard (NZ), Ltd

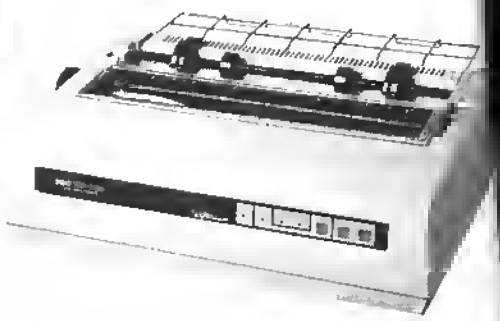
PRINTER ROUND-UP



Printer name: Juki Model 6100
Printer type: Daisywheel
Print speed: 18 cps
Head format: 100 character drop-in daisywheel
Graphics modes: Yes
Std chars/line: 100
Max chars/line: 220 in proportional mode
Paper feed: Friction
Max paper width: 11in
Std interface: Centronics parallel
Buffer size: 2K
Ribbon type: IBM Selectric II ribbon cassette
Options: RS232C interface — $177
Bidirectional tractor feed — $347
8K byte buffer
Features: Proportional spacing mode
Graphics mode
Cost: $1890
Agent: Andas Wholesale



Printer name: Logitec FT-5001
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 100 cps
Head format: 9x9 dots
Graphics modes: 480/576/960/1152 dots per line
Std chars/line: 80
Max chars/line: 136
Paper feed: Friction/sprocket
Max paper width: 10in
Std interface: Centronics parallel
Buffer size: 2K
Ribbon type: Cartridge
Options: RS232C interface
Features: Subscript/superscript modes
48 semi-graphics characters
Automatic paper loading
Cost: $849
Agent: Warburton Franki



Printer name: Logitec WP-550
Printer type: Daisywheel
Print speed: 14 cps
Head format: 100 character drop-in daisywheel
Graphics modes: No
Std chars/line: 115
Max chars/line: 173
Paper feed: Friction/sprocket
Max paper width: $3.5in
Std interface: Centronics parallel and RS232C
Ribbon type: Cartridge
Cost: $1350
Agent: Warburton Franki

DEALERS!

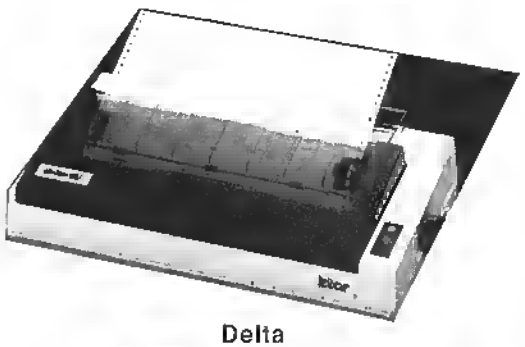
How to improve your profit selling star printers!

Radix

Dear dealer,
This is to introduce you to the new STAR range of printers now available in NZ.

These printers are extremely competitively priced and generous dealer discounts apply.

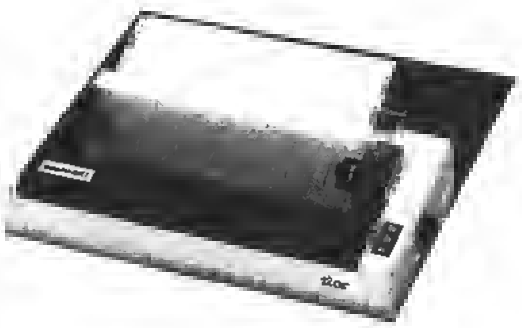
The models available are listed below with brief features and pricing details. Should you require further information please do not hesitate to contact us.



Delta

Star Radix 15″. Speed 200 c.p.s, downloadable graphics, 90 c.p.s near letter-quality, standard features include: parallel and serial Interface, single sheet feeder. Price $2287.59.
10″ version $1962.20.

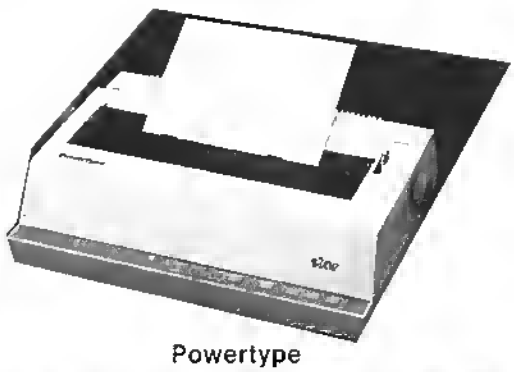
Star Delta 15″. Speed 160 c.p.s, downloadable graphics, parallel and serial interface standard, tractor and friction feed. Price $1622.02. 10″ version $1311.42.



Gemini

Star Gemini 15″. Speed 120 c.p.s, downloadable graphics, tractor and friction feed. Price $1212.82. 10″ version $867.71.

Star Powertype 15″. Speed 22 c.p.s daisy wheel, parallel and serial interface standard, friction feed. Price $1119.14.



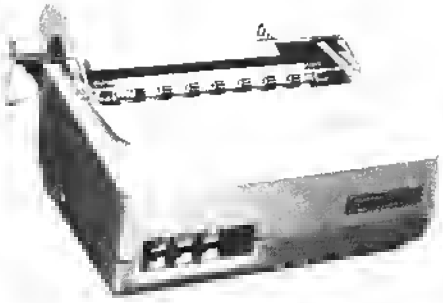
Powertype

All above pricing is end user retail, including 40 per cent sales tax. A ninety day warranty applies to all star printers. Please contact us personally to arrange a demonstration and discuss dealer discounts.

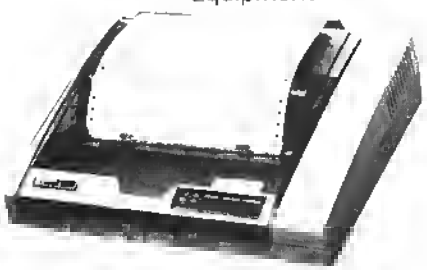
GEMISIS SYSTEMS LTD

65 Huia Road, Otahuhu, Auckland 6, N.Z.
P.O. Box 6255, Wellesley Street, Auckland 1, N.Z.
Phone 27-67349. Telex 2814 (Rocket).

PRINTER ROUND-UP

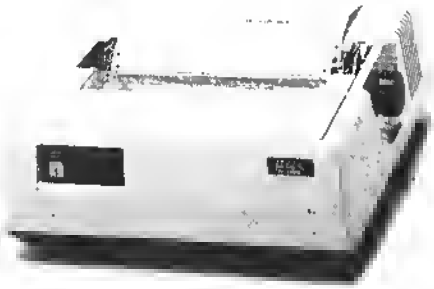


Printer name: Mannesmann Tally MT160L
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 160 cps
Head format: 7x9 dots
Graphics modes: 50/100 dots per inch
Std chars/line: 80
Max chars/line: 160
Paper feed: Friction/tractor
Max paper width: 10in
Std interface: Parallel and RS232C
Buffer size: 80 characters
Ribbon type: Cartridge
Features: Letter-quality uses effectively a 40x18 matrix
Front panel configuration by menu selection
Cost: $1850
Agent: Anderson Digital Equipment



Printer name: Mannesmann Tally Spirit 80
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 80 cps
Head format: 9x8 dots
Graphics modes: 640/1280 dots per line
Std chars/line: 80
Max chars/line: 142
Paper feed: Friction/sprocket
Max paper width: 10in
Std interface: Centronics parallel
Ribbon type: Cartridge
Options: RS232C interface
Acoustic insulation kit
Roll paper holder
Features: Low ambient noise level
Cost: $900
Agent: Anderson Digital Equipment

Printer name: Microline 80
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 80 cps
Head format: 9x7 dots
Graphics modes: Basic block graphics character set
Std chars/line: 80
Max chars/line: 132
Paper feed: Friction/sprocket
Max paper width: 10in
Std interface: Centronics parallel
Ribbon type: 2in spool
Options: Tractor feed unit
RS232C interface
Cost: $972
Agent: Anderson Digital Fquipment



Printer name: Microline 82A
Pinter type: Dot-matrix, bidirectional, logic seeking
Print speed: 120 cps
Head format: 9x9 dots
Graphics modes: 64 block graphics characters
Std chars/line: 80
Max chars/line: 132
Paper feed: Friction/sprocket
Max paper width: 9.5in
Std interface: Centronics parallel and RS232C 1200 baud
Buffer size: 1 line
Ribbon type: 2in spool
Options: RS232C 9600 bps interface — $353
Tractor feed unit — $141
IEEE 488 interface
Cost: $1413
Agent: Anderson Digital Equipment

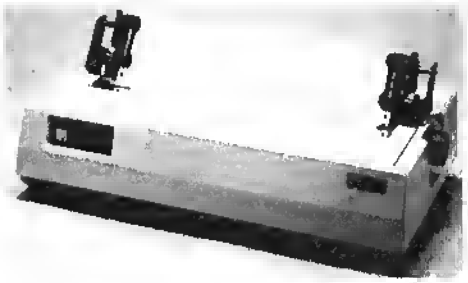
Printer name: Microline 84A
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 200 cps
Head format: 9x9 dots
Graphics modes: 72 dots per inch
Std chars/line: 136
Max chars/line: 230
Paper feed: Friction/tractor
Max paper width: 16in
Std interface: Centronics parallel
Buffer size: 256 bytes
Ribbon type: 3in spool
Options: RS232C interface — $353
IEFE 488 interface
Cut sheet feeder — $780
Features: Near letter-quality mode
Down loading character set
Proportional spacing mode
Cost: $2403
Agent: Anderson Digital Fquipment

PRINTER ROUND-UP

Printer name: Microline 92
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 160 cps
Head format: 9x9 dots
Graphics modes: 72 dots per inch
Std chars/line: 80
Max chars/line: 132
Paper feed: Friction
Max paper width: 10in
Std interface: Centronics parallel
Buffer size: 256 bytes
Ribbon type: 2in spool
Options: RS232C interface — $276
Tractor feed unit — $141

PRINTER ROUND-UP

Features: Near letter-quality mode
Proportional spacing mode
Down loading character set
Cost: $1606
Agent: Anderson Digital Equipment



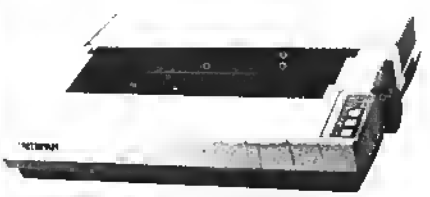
Printer name: Microline 93
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 160 cps
Head format: 9x9 dots
Graphics modes: 72 dots per inch
Std chars/line: 136
Max chars/line: 233
Paper feed: Friction/tractor
Max paper width: 16in
Std interface: Centronics parallel
Buffer size: 256 characters
Ribbon type: 2in spool
Options: RS232C 9600 bps interface
20mA current loop interface
IEEE 488 interface
Features: Letter quality mode
Frontpanel forms controls
Proportional spacing mode
Down loading character set
Cost: $2289
Agent: Anderson Digital Equipment

Printer name: NEC Pinwriter
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 180 cps
Head format: 18x9 dots
Graphics modes: 120 dots per inch
Std chars/line: 80
Max chars/line: 136
Paper feed: Friction
Max paper width: 10in
Std interface: Any interface
Buffer size: 2K
Ribbon type: Cartridge
Options: Tractor feed unit — $114
Cut sheet guide —$ 30
Features: 18-pin head in unique 2x9 staggered format
Letter-quality printing at 90 cps
Easy-access configuration switches
Cost: $1854
Agent: Scollay Computers

Printer name: Pacesetter Pace-80
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 80 cps
Head format: 9x7 dots
Graphics modes: Yes
Std chars/line: 80
Max chars/line: 142
Paper feed: Friction/tractor
Max. paper width: 10in
Std interface: Centronics parallel
Ribbon type: Cartridge
Options: RS232C interface
Features: Epson compatible
Agent: VSI Electronics, Ltd

Printer name: Panasonic KX-P1090
Printer type: Dot matrix, bi-directional
Print speed: 96 cps
Head format: 9x9 dots
Graphics modes: 576/1152 dots per line
Std chars/line: 96
Max chars/line: 136
Paper feed: Friction and tractor
Max paper width: 10in
Std interface: Centronics parallel
Buffer size: 2K
Ribbon type: Cartridge
Cost: $980
Agents: Microcomputer Electronic Company, Auckland

Printer name: Olivetti PR2300
Printer type: Spark-directed ink-jet
Print speed: 50-130 lines per minute
Head format: 7x7
Graphics modes: 110 dots per inch
Std chars/line: 80
Max chars line: 147
Paper feed: Friction/sprocket
Max paper width: 9in
Std interface: Centronics parallel
Options: RS232C interface
Features: Non-impact (quiet) printing
Double and negative image graphics
Cost: $1134
Agent: Andas Wholesale



Printer name: Riteman
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 120 cps
Head format: 9x9 dots
Graphics modes: 480/576/960 dots per line
*Std chars/line: 80
Max chars/line: 132
Paper feed: Friction/sprocket
Max paper width: 10in

PRINTER ROUND-UP

Std interface: Centronics parallel
Buffer size: 1 line
Ribbon type: Cartridge
Options: RS232C interface
Cost: $995
Agent: Control Microcomputers

Printer name: Star Delta 10
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 160 cps
Head format: 9x9 dots
Graphics modes: Block graphics and 480/960/1920 dots per line
Std chars/line: 80
Max chars/line: 136
Paper feed: Friction/tractor
Max paper width: 10in
Std interface: Centronics parallel and RS232C
Buffer size: 8K
Ribbon type: 2in spool
Features: Superscript/subscript /italics modes
Underlining mode
Down loading character set
Macro instructions
Cost: $1311
Agent: Genisis Systems, Ltd, Otahuhu

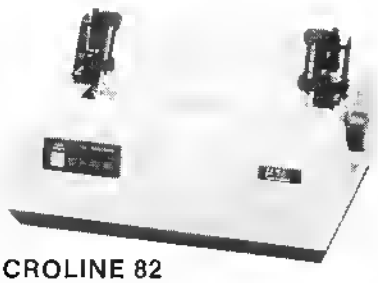
Printer name: Star Delta 15
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 160 cps
Head format: 9x9 dots
Graphics modes: Block graphics and 816/1632/3264 dots per line
Std chars/line: 136
Max chars/line: 232
Paper feed: Friction/tractor
Max paper width: 15in
Std interface: Centronics parallel and RS232C
Buffer size: 8K
Ribbon type: 2in spool
Features: Superscript/subscript /italics modes
Underlining mode
Down loading character set
Macro instructions
Cost: $1622
Agent: Genisis Systems, Ltd, Otahuhu

Printer name: Star Gemini 10
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 120 cps
Head format: 9x9 dots
Graphics modes: Block graphics and 480/960/1920 dots per line
Std chars/line: 80
Max chars/line: 136
Paper feed: Friction/tractor
Max paper width: 10in
Std interface: Centronics parallel
Buffer size: 1 line
Ribbon type: 2in spool
Options: 9600 bps RS232C interface
19200 bps RS232C interface
4K or 8K buffers
Features: Subscript/superscript /italics modes
Underlining mode
Down loading character set
Macro instructions
Cost: $867
Agent: Genisis Systems, Ltd, Otahuhu

Printer name: Star Gemini 15
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 120 cps
Head format: 9x9 dots
Graphics modes: Block graphics and 816/1632/3264 dots per line
Std chars/line: 136
Max chars/line: 232
Paper feed: Friction/tractor
Max paper width: 15in
Std interface: Centronics parallel
Buffer size: 1 line
Ribbon type: 2in spool
Options: 9600 bps RS232C interface
19200 bps RS232C interface
4K or 8K buffers
Features: Subscript/superscript /italics modes
Underlining mode
Down loading character set
Macro instructions
Cost: $1212
Agent: Genisis Systems, Ltd, Otahuhu

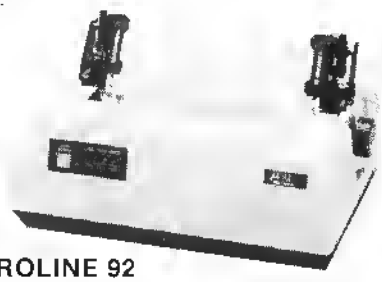
Printer name: Star Powertype
Printer type: Daisywheel
Print speed: 18 cps
Head format: 96 character, exchangeable daisywheel
Graphics modes: No
Std chars/line: 110
Max chars/line: 165

PRINTERS — UNDER $2,000



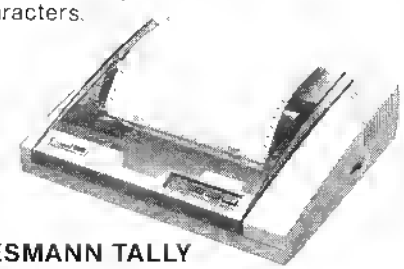
OKI MICROLINE 82
An 80 col 120 cps dot matrix printer. Features include both parallel and serial interfaces, friction and pin feed and an optional tractor feed.

OKI MICROLINE 83
A robust but cost effective business printer with all the features of the 82 but incorporating 136 column width. Tractor feed standard.

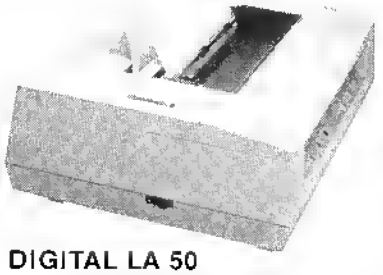


OKI MICROLINE 92
Serial Dot Matrix Printer 160 cps Bidirectional 80 column. The Microline 92 is a high quality cost effective printer, with most features only incorporated in more costly printers.

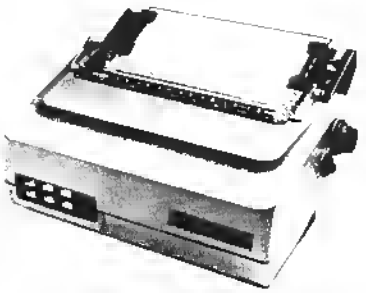
OKI MICROLINE 93
Serial Dot Matrix Printer 160 cps Bidirectional 136 Column. The Microline 93 offers high quality printing and high performance. Features include — proportional spacing, dot addressable graphics, headlife up to 200,000,000 clean crisp characters.



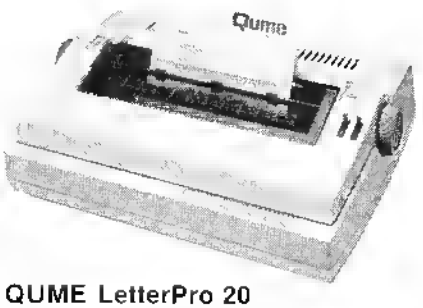
MANNESMANN TALLY
Spirit Microprinter
Comes complete with italics, boldface, underline, superscripts, and subscripts. Even bar charts and graphs. Spirit can be interfaced to most personal computers.



DIGITAL LA 50
A compact low priced personal printer that speeds through your work bidirectionally at 100 characters per second.



MANNESMANN TALLY MT 160
This space saving high performance printer offers word processing, plotting and high speed report printing at print speeds up to 160 cps.



QUME LetterPro 20
An affordable printer offering high quality word processing for small businesses. Features include — more than 20 cps, uses all standard Qume print wheels.

IBM PC compatibility is an option available on all OKI and Mannesmann Tally models.

ADE'S comprehensive range includes other printers for large and complex applications.

ADE

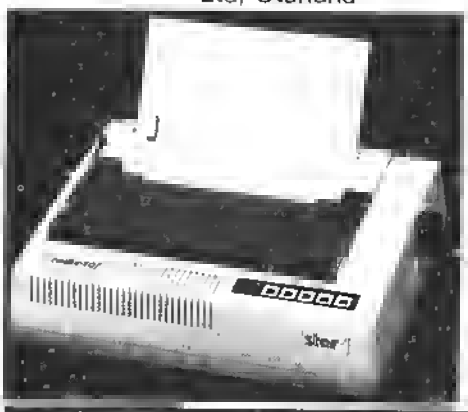
ANDERSON DIGITAL EQUIPMENT

AUCKLAND:
Ph. 590-249, P.O. Box 12-838, AK. 6.
WELLINGTON:
Ph. 693-008, P.O. Box 30-511, L. Hutt.
CHRISTCHURCH:
Ph. 483-001, P.O. Box 25-104, Chch.

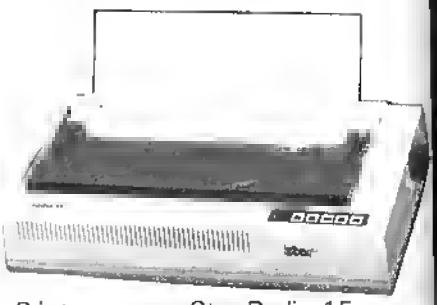
TCC2003

PRINTER ROUND-UP

Paper feed: Friction
Max paper width: 13in
Std interface: Centronics parallel and RS232C
Buffer size: 1 line
Ribbon type: Cartridge
Options: Tractor feed
Features: Over 100 type fonts available
Proportional spacing mode
Easy access configuration switches
Cost: $1119
Agent: Genisis Systems, Ltd, Otahuhu



Printer name: Star Radix 10
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 200 cps
Head format: 9x9 dots
Graphics modes: Block graphics and 280/960/1920 dots per line
Std chars/line: 80
Max chars/line: 136
Paper feed: Friction and tractor
Max paper width: 10in
Std interface: Centronics parallel and RS232C
Buffer size: 16K
Ribbon type: Cartridge
Features: Superscript/subscript /italics/underlining modes
Near letter-quality mode
Down loading character set
Macro instructions
Cost: $1962
Agent: Genisis Systems, Ltd, Otahuhu



Printer name: Star Radix 15
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 200 cps
Head format: 9x9 dots
Graphics modes: Block graphics and 816/1632/3264 dots per line
Std chars/line: 136
Max chars/line: 233
Paper feed: Friction and tractor
Max paper width: 15.5in
Std interface: Centronics parallel and RS232C
Buffer size: 16K
Ribbon type: Cartridge

Features: Superscript/subscript /italics/underlining modes
Near letter-quality mode
Down loading character set
Macro instructions
Cost: $2287
Agent: Genisis Systems, Ltd, Otahuhu

Printer name: Star STX-80
Printer type: Thermal dot-matrix
Print speed: 60 cps
Head format: 5x9 dots
Graphics modes: 8lock graphics and 480 dots per line
Std chars/line: 80
Max chars/line: 80
Paper feed: Friction
Max paper width: 8.5in
Std interface: Centronics parallel
Features: Quiet thermal printing
Roll thermal paper
Cost: $450
Agent: Genisis Systems, Ltd, Otahuhu

PRINTER ROUND-UP

Printer name: Texas Omni 850
Printer type: Dot-matrix, bidirectional, logic seeking
Print speed: 150 cps
Head format: 9x9 dots
Graphics modes: 480/576/960/1152 dots per line
Std chars/line: 80
Max chars/line: 132
Paper feed: Friction
Max paper width: 10in
Std interface: Centronics parallel
Ribbon type: Cartridge
Options: Tractor feed
4K buffer
Features: Raster graphics capability
Cost: $1799
Agent: VSI Electronics

Distributors!

Is your printer listed here? Make sure you keep us up to date with your printer lines by putting the following on your mailing list:
1. The Editor, *Bits & Bytes*, Box 827, Christchurch.
2. Shayne Doyle, 18 Holdsworth Avenue, Upper Hutt.

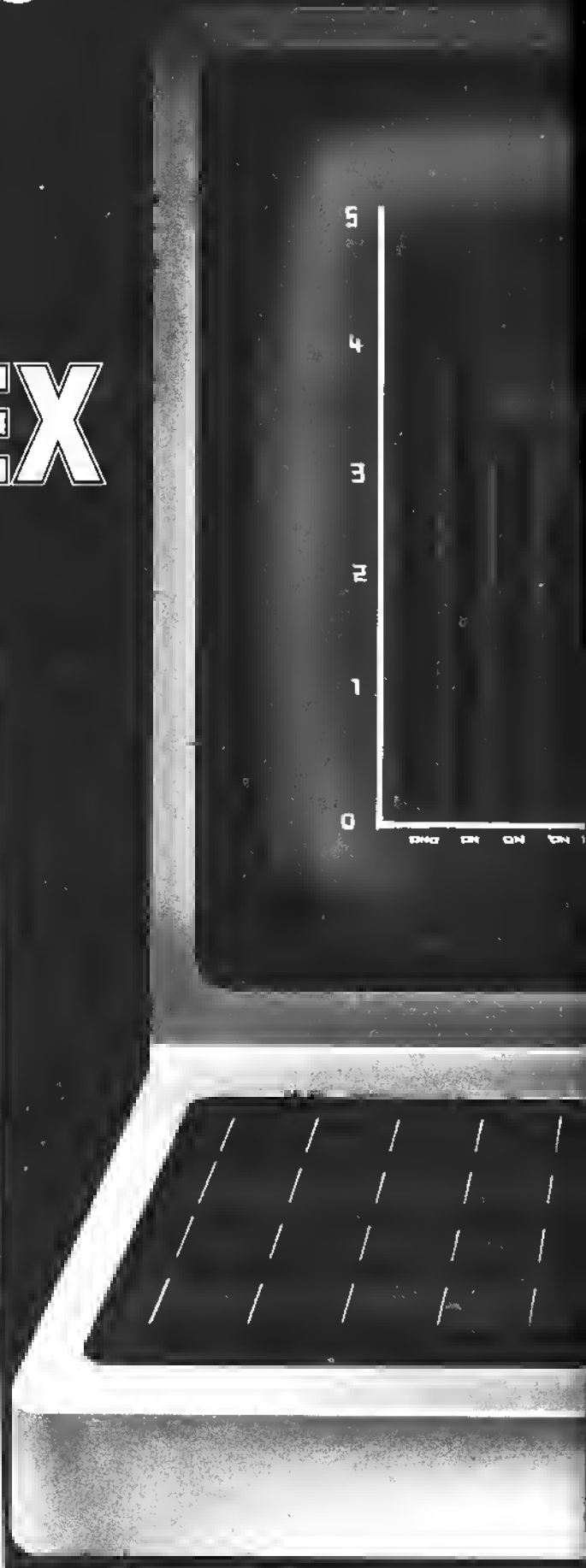
Sharp interest

Sharp's MZ700 computer is meeting a lot of interest on the local market, particularly from educational institutions using Pascal, according to the local distributor. A Pascal compiler tape is available for the machine.

2ZA Living with Computers and Electronics

RADIO MANAWATU 2ZA

COMPUTEX '84



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- for your business!

Palmerston North Convention Centre

Friday 13 July	9am - 9pm
Saturday 14 July	10am - 5pm
Sunday 15 July	10am - 5pm

* displays, demonstrations, information, advice
* "How to select a computer" - mini-seminars with Peter Isaac, Friday 11am and 2.30pm
* "User Day" activity, displays Sunday all day

  ('Users' - phone Radio Manawatu (063) 84129 to register)

* Door Prize!

  - you could win a Personal Computer

Adults $2 Children $1 Family $5

Atari's new XL series

By Peter Ensor

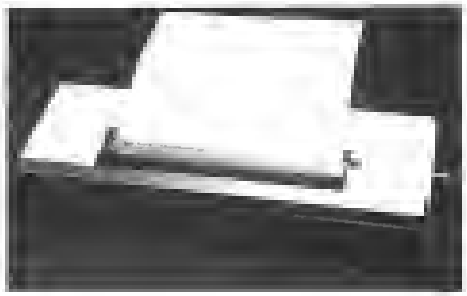
The Atari 600XL (front) and 800 XL computers

The Atari XL series has been recently released. Following the philosophy of earlier Atari home computers, the firm has produced a range compatible with its earlier models, both in hardware and software to make best use of the software already available.

The two computers are constructed in a very light-weight modern style, with a neat use of the cooling fins to enhance the design.

The 600XL and 800XL differ only by the amount of in-built memory. This means that a 600XL can be built up, using a memory expansion pack, to equal the 800XL in performance.

One area where the machines differ strongly from the previous models is that the BASIC cartridge is now supplied as ROM already in the machines ready for use.



The Atari 1027 letter quality printer

Novel on these machines is a self-test facility. This command tests such areas as the memory, keyboard and sound channels. A rarely used novelty that would be good if the user suspected something wasn't working correctly.

Turning the machine on revealed a blue square with the word, READY, in the top left corner in white printing: very easy to read and pleasant to look at for long time spans.

As well as the usual computed subroutines call and GOTO commands, a variation had been added. This form uses a variable to contain the label rather than a pointer into a list. An example of this would be GOSUB A+30. As the manual points out, this would be very difficult to debug but much more flexible than the label list that must usually be supplied.

Another useful command is TRAP. This enables the program to trap what could otherwise be fatal errors, such as output to the printer when it is not connected. The program would trap out to a specified line where the error could be identified by the error number and all future printer statements could be side stepped.

The graphics commands are not very abundant, but are enough to get by with. The only high-level graphic command is to draw a line. This command works quickly and produce a good line.

The machines are boasted to have 256 colours. This is true to a degree: the machine has 16 different colours with 16 different intensities for each colour. These colours were shown on the dealers' demonstration disk and produces some very good pictures.

One colour missing from the manual is white. Atari prefers to be modest with this one and calls it grey, but at full intensity this produced an excellent white.

While the graphics may be good, the computer does not appear to have sprites. The demonstration program calls some objects that float around the screen sprites. While they have distinctive sprite-like qualities, the documentation and the list of commands soon dispel this rumour.

The sound is made up of four voices. Each voice is controlled with its intensity, frequency, and timbre or sound quality. Each voice acts independently and covers four octaves. This produces some good harmonies.

The machine is able to print both upper and lower case as well as graphic symbols on the screen at once. But for those who are into word processing, the graphics can be put to one side in favour of an extensive international character set.

The disk drive comes in a matching design case with a power supply that plugs into the wall. Now starts the trouble of finding a two-way adapter.

I wouldn't recommend starting up the disk drive before reading the manual. The computer just sits there looking at you making a series of funny noises while thoughts of corrupted disks go through your mind.

After a while, the beeps that occur while the disk operating system (DOS) is loading become annoying, especially since they are random sounds. The keys make a noise as each key is touched but this is acceptable because some reasoning can be made of the sound. One way to beat all this of course, is to turn the TV sound off.

The DOS is excellent, though. No more of this remembering commands.

Once the DOS has been loaded in, typing the command, DOS, brings up a menu driven table for all the operations. When finished with the DOS the letter B is typed and the machine is back in the programming mode.

PRINTER QUALITY SURPRISES

The printer comes up with surprising results. While it is called a letter-quality printer, its price looks very suspicious, but the printing it gives out is real letter-quality print.

Looking through the top perspex revealed a barrel with all the letters on it similar to a barrel printer but with the barrel in front of the paper. This barrel has four rows of letter and is hit by a hammer through the paper when the correct letter comes around.

There is no ribbon. The ink is put to the barrel by a roller on the side away from the paper and works on the same principle as a rubber-stamp pad. The quality rivals that of many electric typewriters. An underline facility is available.

The speed was clocked at eight characters per second for the 80 column line including the line feeds.

	CURRENT	%	YEAR-TO-
E			
ES	26,594.33	100.0	26,59
OF SALES			
T OF SALES	16,289.27	61.3	16,29
PROFIT	10,305.06	38.7	10,30
SES			
ARIES AND WAGES	3,028.51	11.4	3,02
T	1,600.00	6.0	1,60
LITIES	453.38	1.7	45
ROLL TAXES	242.96	.9	24
EREST	228.42	.9	22
URANCE	659.84	2.5	65

A sample report from the 1027 letter quality printer

I found three manuals under the computer: one dealing with how to connect the computer to the TV; a BASIC reference manual; and a manual specific to the machine.

Reading the BASIC and machine manuals was very disappointing. The manual for the machine explains what all the buttons and knobs are used for as well as all the sockets on the sides. It then presents three short programs as examples and concludes with a question and answer session. This level of documentation can be described only as skimpy. The distributor, however, is supplying fuller documentation separately.

The BASIC reference manual suffers from the same problem. A few lines are given on the command and some examples. Both of these manuals are thick, 66 pages each, but the section printed in English ends on page 11!

One thing that would be nice to see in the manuals would be some specifications on the machine: I could find nothing technical.

I would also like to see in the manual how to make use of the HELP and SELECT keys.

Two disk manuals are supplied. The first is a glossy, novice-type manual with lots of colour. The second goes into more detail, but still has nothing too technical.

Conclusion: These computers performed well, with a strong ability for games and charts, but do not offer much to the programmer in the way of debugging tools.

For an even cheaper entry into the Atari range, the compatible Atari 400 would still be recommended. This machine is definitely to be included on the shopping list.

Microcomputer summary

Name:	Atari 600XL and 800XL.
Microprocessor:	6502.
Clock Speed:	1.79MHz.
RAM:	600XL – 16K, Expandable to 64K. 800XL – 64K.
ROM:	12K.
Input/Output:	Unbuffered parallel port. 2 joystick/paddle ports, serial port, peripheral port.
Keyboard:	62 keys, qwerty style with auto repeat.
Display:	40 x 24 upper and lower case with graphics symbols or international character set.
Language:	Microsoft BASIC, Logo, Pascal, Fortran, Pilot, Assembler, Forth.
Graphics:	16 colours with 16 intensities; max. resolution of 320 x 192.
Sound:	4 voices with volume, frequency and timbre control.
Cost:	600XL $599 : 800XL $899.
Peripherals:	80K/160K auto-selecting disk drive $995; cassette $199; letter-quality printer $795; colour printer $595; touch tablet $199; numeric keypad $249; expansion RAM $350; joystick $19.95; paddles $39.95 pair; trak-ball $119; AC modem $500; interface module (serial and Centronics) $500.
Reviewer's rating:	**(out of 5)** Documentation: 1, ease of use: 5, language: 5, expansion: 5, value: 5, support: 5.

Review unit supplied by Monaco Distributors, Auckland.

The Challenger

Dick Smith takes on the IBM PC work-alikes

By John Slane

Back in the 1970s a little home/hobbyist computer was launched, called the TRS-80 Model I. A firm called Microsoft wrote the resident BASIC program and operating system for the Z80 processor. The mix of hardware and firmware became a computer classic. Radio Shack could hardly believe its luck. Business took off like a rocket. The bandwaggon was ready for jumping on and Apple and Commodore arrived with their own very distinctive and very different machines.

Dick Smith (Electronics) decided that its way on to the bandwaggon was to buy the rights to Microsoft as used in the TRS-80 and put together a Model I work-alike. So the System-80 was born and lived to prosper and even to survive a copyright suit.

Now the TRS-80 is out of production and the System 80 has gone with it.

A new star has risen:— the IBM PC. In spite of modest, conservative hardware, and in spite of an operating system that is only a little better than CP/M, the IBM PC has won a reputation as "the computer to have". Consequently, software houses are busy writing programs to sell to the thousands of PC users.

The Dick Smith Challenger

Another bandwaggon to jump on? It appears so. A flurry of so-called work-alikes or clones is being reported in overseas journals, and a sprinkling of the machines themselves is starting to arrive in New Zealand.

Dick Smith is now doing a "System-80" job on the IBM PC — the Challenger. In all significant areas it has the same hardware and firmware architecture as the IBM PC — for one reason only — so that it will accept and run "most" IBM PC software. For the price, $5000, the Challenger is not necessarily the *best* computer that could be devised; it is merely a cheaper clone of the IBM PC.

For that reason, a review of the Challenger is fraught with difficulties. Should one report on and praise the good features of the IBM which are shared by the Challenger? Or comment on the IBM's poor features and criticise the Challenger for having them, too? This review does inevitably touch on comparisons between the two machines, but is mainly a report on the Challenger as a computer in its own right.

Dick Smith will sell the "System" only, consisting of keyboard and processor with 128K RAM for $2000 (no monitor). It doesn't have Disk BASIC, obviously, and no RS-232C I/O, but has just about

everything else the expanded version has including full graphics, sound and colour. Would you want all this power on a cassette-based system?

The expansion unit comes with some extra I/O ports, two Shugart double-density double sided 5¼in drives for a total of 720K bytes — and comes also with three separate software packages; Perfect Writer/Speller, Perfect Filer, Perfect Calc. All have been adapted to be Challenger-specific. If you would have bought these programs anyway, the Dick Smith package represents a real discount.

The expansion unit is designed to clip on above the system unit with all three connecting cables tucked out of sight. It all goes together very neatly, once you have found the instructions in the second-to-last chapter of the *Expansion Unit Manual*.

The two boxes mostly contain fresh air, and are far larger than they need to be. When the monitor sits on top I found it too high for comfortable reading. IBM does the configuration much better, but then the IBM PC can't be split down to a basic non-disk system as the Challenger can.

Incidentally, the keyboard can be unplugged and slid into a specially designed recess in the system unit. If you don't want to do that, the two manuals fit the same space quite well.

The manuals are in small neat ring binders, typewritten with some use made of bold face. No, you won't find everything you want to know about programming a computer. For a machine at this level of sophistication the manuals quite properly presuppose a good level of knowledge by the user. Of more concern is the lack of any index and the unfortunate evidence of sloppy proof reading in general text, in command instructions and in the listing of sample programs.

On the plus side, when you do eventually find what you want, it is generally written in outstandingly clear and economical prose.

SELF-CHECK ON POWER-UP

On power-up, the system carries out a diagnostic check. This gives time to put in a system disk and pop the latch before disk boot-up starts. If a disk is not found, the computer automatically goes into cassette BASIC.

The disk operating system, as with the IBM PC, is basically a dressed up, somewhat friendlier, CP/M. "Pipe" commands are available as on Unix (and some 8-bit utility DOSs) and there is a comprehensive set of commands for batching, filtering, DOS editing and line editing for source programs and text files.

BASIC and DOS are quite firmly separated environments. Relatively few BASIC commands are available to access MS–DOS and then return to BASIC. However, chaining and variable passing between programs is very well provided for. Variables can be up to 40 significant characters, but disk files can only be eight characters plus a three-character extension. Ex-Apple users aren't going to be pleased with that last fact. However, strings and program lines can be up to 255 characters.

Disk BASIC is very comprehensive indeed, and should have everything you need unless you are looking for a version of structured BASIC and routines called by label.

A full screen editor is provided. The cursor keys share selected digits on the numeric pad. An IBM PC idea which is a mixed blessing.

As standard, Challenger comes with full graphics, colour, and sou capability and a very usable set commands to control these featur Excellent use can be made commands such as LINE, PLA COLOUR, SCREEN, which require minimum of parameters. R positioning of shapes (a sprite-li process) is provided for. Scre linearity on the review unit wa excellent. Circles were perfe circles. A colour monitor was n provided, so the colour capabiliti are not able to be reported.

I suspect we probably have games machine of some potential the Challenger. Not for nothing is provided with a joystick port.

In common with a large number computers, Challenger is not ver good at some arithmetic. It can accurately count from 0.01 to 1.0 in steps of 0.01. This, incidentally, i why fractional numbers need to b rounded before testing fo equivalence.

Many computers around th Challenger's specification have hig resolution character generators an pleasing font styles. The Challenge has neither. Letters are coarse an undistinguished in style. In 8 character mode, the letters m and w have ugly blobs in the middle Generally, the Americans are bette at text presentation than thei overseas competitors (see text o TRS-80, IBM, Hewlett-Packard, fo outstanding examples.)

The review unit was unable t display the special characters said t lie between ASCII 129 and 255.

One of the more serious criticisms I have of the Challenger is the extraordinarily inept routine fo scrolling. The screen first has t clear, then rewrite everything one line up starting top left. The routine is frustratingly slow such that it is impossible to use cursor-repeat to slide a window around, say, a Calc sheet. Move too fast and the screen

blacks out apart from a nervous flickering at the top. On informal benchmark tests between Challenger and IBM, general processing times were similar until any screen scrolling was required — then Challenger was up to 50 percent slower than the IBM PC.

The 84 keys include a separate numeric pad, 10 function keys and special keys such as INSERT, DELETE, SCROLL. Using the "ALT" key with alphabetic keys produced keywords and commands.

Although a nearly identical copy of the IBM PC keyboard, the Challenger keyboard seems flimsier, not as smooth to operate, and the keys make a disconcerting clatter under heavy use. Over all, it is a mediocre keyboard consistent with a cost — cutting exercise.

WHAT'S SPECIAL ABOUT IT?

Although RAM looks to be substantial, and capable of being addressed by a "genuine" 16-bit processor (8086), users may be surprised to find as little as 49K available under Disk BASIC. In fact, the designers have banked the RAM into 64K blocks for "increased efficiency". This means the BASIC user has to know how to do clever things with special calls and machine language to access the full RAM. The 128K (or up to 640K) is really only expected to be used by commercial software which uses spooling and/or multiple buffers as in Calc sheets and word processing.

So what's the difference between a fast 8-bit with bank-switched memory and a Challenger 16-bit? Well, price to shart with. The Challenger is still cheaper than some 8-bits feature for feature and has to be seriously considered against all the other 16-bit machines.

Some people will have identified IBM software that suits their specific requirements — business applications or whatever. These people may need programs that are complex, employ sophisticated routines, and capable of supporting large data bases and run at respectable speeds. So there will be a strong temptation to look at a cheaper alternative to run these. But will the Challenger run these programs?

Dick Smith says the Challenger "can run just about all" the IBM PC software. I was obviously unlucky. The one program I tried (a version of IBM BASIC) came up on the directory listing but wouldn't load. However, the Challenger got its own back. A graphics program I wrote for the Challenger wouldn't run on the IBM. That particular IBM PC didn't have the graphics option installed.

On the question of compatability, users would be wise not to assume that an IBM PC program will run on the Challenger. Each case will need to be tried and proved.

Summary

I would find some aspects of the Challenger continually irritating: its physical size, difficulty of finding a good position for the monitor, poor text presentation and scrolling, mediocre keyboard. And I'm not all that excited about MS-DOS as an operating system. But I might just manage to live with those shortcomings if the Challenger is finally found to be the best machine around for its price.

Microcomputer summary

Name:	Dick Smith Challenger
Manufacturer:	Ferranti Computer Systems, Ltd
Microprocessor:	8086 16-bit
Clock Speed:	4.77 MHz
RAM:	128K, expandable to 640K. 16K video RAM
User RAM:	62K under standard BASIC 47K under Disk BASIC
ROM:	64K
Input/output:	(with Expansion Unit): Cassette, joystick, light pen, Centronics-type parallel printer, RS-232C, 5 expansion slots, three IBM compatible, two 16-bit.
Keyboard:	Detached unit. 84 keys, typewriter style.
Display:	80cols by 25
Languages:	Advance 86 operating system, Microsoft MS-DOS2.1 GW Disk BASIC
Graphics:	320 x 200 with 8 colours, 640 x 200 high resolution, black and white only
Sound:	Built-in speaker. Sound and play commands
Cost:	Keyboard and processor ("System"): $1999.95 Expansion unit, including 2 x 360K drives and three software packages: $2999.95
Software:	Claims to run "most" IBM PC
Options:	10 Mb hard disk (Price not available at present)
Reviewer's ratings:	(Out of 5): Documentation 3, ease of use 4, language 4, value for money 4–5, support, not yet known. Should be OK from Smith. As good as System 80, Expansion, 5.

Review Unit from Dick Smith Electronics, Auckland.

[A spokesman for Dick Smith in Australia says that the manuals are interim ones; the final versions are now in production. John Slane's problem in displaying special characters between ASCII 129 and 255 has not been found on any production models tested in Australia. — Editor]

"Atari" printer

The printer being sold with the new Atari 600 and 800 models is also available for other computers.

Viscount Electronics (P.O. Box 513, Palmerston North) is selling the LTR-1 with a standard Centronics parallel interface for $759.

An example of the excellent print quality of this printer is included in our Atari review.

SORD IS-11

Exciting, but not yet perfect

By Shayne Doyle

The Sord IS-11

One of the hot areas for development in micros at the moment is in the portable "lap" computer market. These are exciting machines, truly portable and with a lot of useful software included. They are not yet perfect, however, and I consider the current generation of such computers an intermediate and necessary development step in their design evolution. The Sord IS-11 is such a computer, the first lap portable from this company, which has produced excellent business micros for a considerable time now.

The basic IS-11 is the customary A4 size, finished in cream and grey. It may be extended by the addition of the 40-column thermal printer which attaches on the left side, and by the numeric keypad, which is fastened on the right side. Both these extras are sized and styled to match the computer and increase its width about 70 per cent.

Above the keyboard is the large LCD display which has an associated

viewing angle adjustment on the rear of the computer. I found that even with this control, the display was not easy to read, particularly in low light situations. The display has reference marks inscribed to the left and below, corresponding to lines and characters. I found the display very slow, but cannot say whether this is software or hardware (I suspect the latter). The display may be split up into eight defined windows, several of which can be viewed at once.

To the right of the display is the removable microcassette drive, fully software controlled. These little drives are magnificent examples of Japanese electronics prowess. It is a pity they are not available as a universal micro peripheral with parallel interface. This one operates at 2000 baud, and stores 128K bytes of data on a C30 microcassette. The keyboard is a full sized, fully featured unit, with a good feel to it. I did find that each keypress produced a faint "spring ring" sound which began to annoy me after a while. Along the top of the main keyboard are the escape and reset buttons, six function buttons, and four cursor keys.

The rear of the computer holds most of the input/output connectors: power and reset switches, AC adapter/battery charger socket, bar-code reader socket, serial and RS232C interfaces, and parallel system interface. On the bottom surface are two indented connectors for the Centronics printer and numeric keypad. Under the cassette drive is a deep slot which takes the ROM cartridges.

Similar to most other lap portables, the IS-11 has low-power, CMOS memory supplied by rechargeable batteries. Switching the computer off stops only the processor and powers down the display and support systems. Beneath the machine is a switch labelled BACKUP, which controls the memory power supply. The batteries are good for about eight hours average use, but this depends on how much the cassette drive is used. An "L" appears on the screen and the supplied battery charger must be connected up overnight.

The memory is partitioned into files; the number and sizes are specified by the user. These files may be either data files, edit files, or calculator files, produced by the relevant software. Should the user run out of memory for a new file, older ones resident in memory may be transferred to tape to free up the memory.

The Sord IS-11 does not have any programming language built in. I think this detracts from it. However, for a businessman intending to use this computer, it probably will not matter. I understand a version of Microsoft BASIC is to be released shortly on a plug-in ROM cartridge.

PIPS is probably the major software tool in the IS-11, and this is a very powerful spreadsheet program. Like all spreadsheets, the data is organised in tables, and these may be manipulated in a variety of ways. Multi-key sorting is provided, data may be graphed and displayed in either pie or bar graph formats — amazing to see on a small LCD screen!

Microcomputer summary

Name:	Sord IS11.
Manufacturer:	Sord Computer Corporation, Japan.
Microprocessor:	CMOS Z80A, 3.4MHz clock speed.
RAM:	32K, expandable to 64K.
ROM:	64K.
Keyboard:	72-key standard, full travel ASC11, plus six function keys, upper/lower case, auto repeat on all keys.
Display:	LCD display, 8 x 40 character lines, 256 x 64 graphics dots.
Input/Output:	Built-in software-controlled FSK 2000 baud microcassette drive. Standard interfaces provided for: parallel and RS232C, second audio cassette port, parallel I/O port, Centronics printer port, numeric keypad port, ROM cartridge slot, bar-code reader port.
Languages:	PIPS spreadsheet software, database software, word proccessor.
Options:	3.5 inch microfloppy disk drive (under development); CRT monitor interface (under development); 64K ROM software cartridges; add-on numeric keypad with 16 function keys; add-on 40 character 10 cps thermal printer; bar-code reader; acoustic coupler.
Cost:	$2200.

Review machine supplied by Sord Computers, Ltd, Wellington.

HARDWARE REVIEW

The bottom line of the display nearly always has a menu selection which coincides with the function keys below. The user may navigate the system by merely pressing the appropriate function key to register his or her choice on any screen. The software is set up in a tree structure, each selection leading the user to the next lower level along that branch. Pressing ESCAPE will always pop the user out of the level he is in, back to the previous one.

I-EDIT is a simple, cut-down text editor which allows the user to create, edit, print, and save short documents or notes. It offers automatic screen wrap-around and is compatible with the main word processor.

I-CAL provides a programmable printing calculator with the capability of saving calculations to tape. The computer actually draws a sort of calculator on the LCD screen.

I-COMM gives the user extensive control over the serial and RS232 interfaces. The two are different in this machine. The serial interface is really intended for connecting to a modem, an option in the United States. The I-Comm software may be used to connect the IS-11 to other computers. In America the I-TSS timesharing package allows terminal emulation for Infonet, The Source, and Dow Jones.

I-TRANS is an optional data conversion software program which provides compatibility with MS-DOS and CP/M programs such as Lotus 1 2 3, WordStar, Supercalc and Visicalc, dBase II. Another optional ROM cartridge features a word processor with full cut-and-paste and word-search facilities.

I found it a welcome change in the week I had the computer, to be freed of the normal ties of a computer system. To pop the IS-11 into my briefcase and bring it out for use at any time, anywhere, is at first a novel freedom. However, I fairly quickly found myself wishing for a better display, more speed, and a built-in language. The machine I had was a sample unit, and unfortunately no other options are available at the time of writing, so I am unable to report on the thermal printer and other software.

The manuals were also preliminary versions, lacking detail in some important areas, notably in the I-Comm section. The PIPS manual was reasonably detailed however, and featured lots of "frinstance" pictures of screen displays to help understanding the text.

No-longer secret schools report evaluated

By Nick Smythe

Thanks to the efforts of the Coalition for Open Government (COG) and a Christchurch computer programmer, Mr Bill Rosenberg, the official 1982 report on "Micro-Computer Equipment for Secondary Education" has suddenly been released (if you want a copy for yourself it is a document with the CDS Reference number 1982/03). The reason for this about-face by the Minister of Education, Mr Wellington, who authorised the release, appears to be COG's willingness to go to court to challenge the original grounds of suppression.

What does the report tell us? Certainly its age means that it tells us nothing about what is currently the best buy for education. However, it does say a great deal about how the committee that produced the document worked. It also suggests that the evaluation exercise was flawed in certain areas and worked rather loosely within the specifications originally circulated for school microcomputers. In some cases, relevant areas of the specifications have been overlooked, in other cases areas not mentioned in the published specifications have been taken as significant factors. It certainly tells us no commercial secrets.

The document itself is a frail item to have attracted so much attention. It runs to 25 pages, a mere eight pages of report plus five appendices. Appendix 1 is a single page detailing interest in proposing systems (20 firms replied with five of these declining to offer proposals). Appendix 2, of eight pages, reviews the characteristics of eight machines placed on an original short list. The treatment is brief (about that found in a summary box in a good hardware review in *Bits & Bytes*), and marred by errors of both inclusion and ommission. Appendix 3 is a summary of hardware already in schools in July, 1982 (four pages, some irrelevant). Appendix 4 is a stab at defining a standard Pascal for school use. Appendix 5 spends 4 pages speculating on optional bulk-buying strategies. In terms of comparative machine evaluations the last appendix is hardly relevant and the Pascal definition is unconvincing.

The main body of the report summarises the progression by which the original 15 proposals were filtered down to just five machines. For a start, machines were divided into "possible" (8), "unsatisfactory" (3), "alternative" (1) and "deferred" (3). The alternative proposal was for a CDC mega-computer running Plato to school terminals from a central site. More interesting was the inclusion of Commodore, IBM, and Northstar as proposals "deferred" on the grounds of unavailability of sample equipment. Deferral implies ongoing assessment and reassessment, and an acknowledgement of rapid change. Just what happened to this ongoing reassessment?

The eight "possibles" were extracted from the 15 originals by comparing each machine's specifications with the department's requirements. This yielded the final five machines plus the Monroe EC8800, the TRS80 Model III and the Hitachi MB6890. Suppliers were then asked to provide example equipment for benchmarking and testing. Considerable problems appear to have been experienced in obtaining all necessary items. The tests were conducted with a network of just two microcomputers : enough to assess whether, for instance, a Pascal and BASIC program could be running and assessing data at the same time. Not enough, though, to assess classroom practicality with a larger set of machines where network speed is crucial and contention between users becomes an issue. The machines were reportedly tested using "standard benchmarks" to assess the individual and network capabilities. Unfortunately, the benchmarks are not documented in the report nor, curiously, any information on speed of performance. Rather the machines either pass or fail. On top of this the experience of different committee members was pooled to create a "3-star" table evaluating specific features of the machines (of which more shortly).

COMMON LANGUAGE FOR COURSEWARE

The technical findings were then placed in perspective by a set of comments detailing school ownership, discussing hardware needs for specific end uses and noting possible New Zealand contents of the machines. At this point the spectre of a common language for courseware raises itself. The idea is put forward that Pascal could provide the basis for software standardisation independent of machine type (with the "minor" exceptions of graphics and sound) and that standard Pascal should be a high level of priority. Programs would be portable through simple "translators" that produced equivalent graphics code for any different machine types.

There is much of interest in this shift. First, it betrays a mathematician/programmer's view of the world. Pascal is a very nice language for the initiated but it is a hard starter language. BASIC, on the other hand, is an easy starter (important given the computer experience of most teachers in 1982) and in a structured form is equally conducive to good programming habits. The idea of standardised programs under Pascal also betrays a concern with traditional, text-based computing applications. However, most courseware units would make intensive use of graphics. The truth is that few software translators work here. How can a single-screen machine, for instance, emulate a unit that employs the Poly's five simultaneous screens? How, in any workable way, could a Poly emulate the BBC's colour registers and

flashing colours. Even two years ago these issues were clear. What is disturbing is that the fallacy of a standard courseware language still lingers on in 1984, even as the width of available special-purpose languages increases.

Of course, the most significant point about the comments on Pascal is that they represent a shift from hardware standardisation to software standardisation . . . and in the report this shift is never overtly recognised or argued. Yet it is at the heart of the failure of the report to provide a standardised hardware environment for educational computing. If software compatibility was the new catchword then there is a lack here of discussion of one trend to (non-graphics) standardisation in the form of 16-bit operating systems such as MS-DOS, which might have counselled delay in choosing a machine.

If inter-machine software compatibility were a concern it should have been:

- A dominant requirement in the specifications, and
- Discussed in detail in the report.

As it is it is inadequately discussed, although its adoption as a viable criterion for standardisation undermines the entire original thrust of the committee. The over-all impression is that there was a singular lack of expertise in the report.

DISCUSSION FULL OF ANOMALIES

The software/courseware discussion is full of anomalies.

It is, for instance, also interesting that while the Pascal debate switches the evaluation towards software considerations other important software ramifications, most notably the importance of the availability of authoring languages and software development utilities are ignored.

Apple suffers particularly here, where its Apple II graphics are (in hardware terms) poor but in practice are effective due to the number of software enhancers, animation editors, et cetera, available.

An insight into the view of courseware held at the time is given by this quote: "The choice of language should be restricted to either BASIC or Pascal to enable teachers to tune the issued courseware to reflect their teaching styles. This would be similar to how they alter or leave out a page in a series of standard overhead transparencies."

Has whoever wrote that ever edited a teaching unit? Does this suggest the sort of software one would hope to see? "Skeleton" programs tailored to local needs are one thing, and well worth while. The transparency analogy is a little unfortunate, though, and conjures up images of the most banal form of computer education (which in any case are best handled by author languages).

There are also anomalies in the technical reports and ratings for specific machines. These range from the small to incredible. Of the many minor points at question one can note Poly whose graphics are criticised as having poor colour definition and non-individually addressable pixels. The first is arguably unfair. The latter is true . . . but the Apple II is positively noted as having 'each pixel addressable' when in fact it uses an almost identical screen mapping technique to the Poly, i.e. some of its pixels, too, are non-independent. Significant factors such as number of simultaneous screens available or the link between graphics hardware capabilities and the language drivers appear to have been ignored.

The comments on networking are even more idiosyncratic. The NEC network is described as "too business oriented" and gets two-star rating, while the excellent business network, Nestar, on the Apple gets three stars (irrespective of cost). The outstandingly conceived Econet on the BBC gets two stars for its inexpensive 400 kilobaud network. The BMC gets three stars for what by comparison is an exceedingly slow and inflexible system.

The BMC figure is even more puzzling if one delves into the technical comments on each machine. Here we find that in fact the BMCs were not demonstrated as a network. Rather, two stand-alone machines were evaluated. This was augmented by looking at a larger minicomputer that was to be the driving machine for the network. The network was assessed on the basis of this driver with two dumb terminals attached. The comment on the network was: "Excellent, so long as the modified BMCs attach as well as the screen did."

It is hard to credit an evaluation was made on such an assumption. Will my ZX81s work like an IBM terminal if I network them through an IBM mainframe? Yet at the same time that BMC gets a top rating on product under development Pol again gets the short straw by havin its forthcoming network releas largely discounted.

Another inconsistency: Apple wa noted as having no sound except b PEEKs and POKEs while BMC i distinguished as "having a musi macro-language available". I additional fixes are relevant wh then are the numerous Apple sound options ignored.

'CHOP LOGIC' IN CONCLUSION

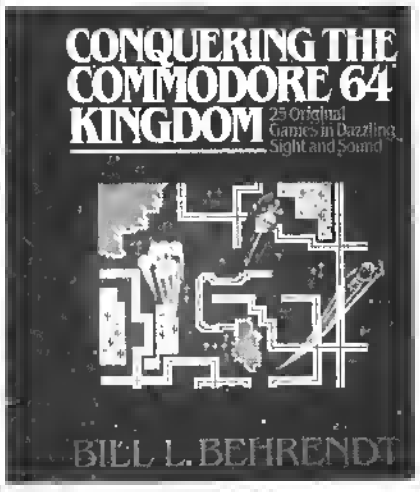
The report's final conclusion is characteristic in its chop logic: "No supplier has a system which is clearly superior to the others in all respects but five come close." Just think about that sentence a little.

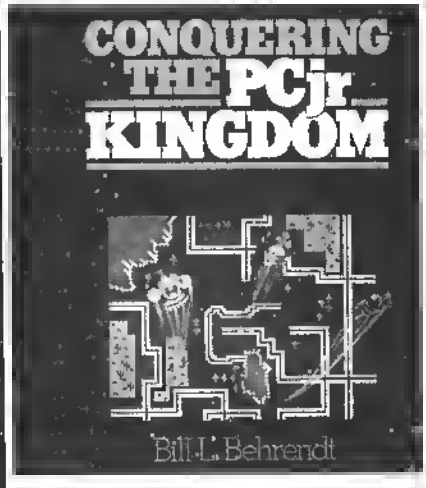
There is a lack of consistency in the report's comments and an insubstantial air to the document. A fair comparison might be with an evaluation circulated by Poly computers after the original suppression of the report. This document sought to evaluate the five chosen machines rigidly against the criteria of the original machine specifications. Not surprisingly, the Poly came out top! Notwithstanding the errors in this evaluation, too, Poly's attempt was longer, better argued and significantly, better documented than the original. All this time from a small firm without the resources of the Department of Education and the State Services Computer Services Division behind it.

The report is a disappointment. The motive for its suppression is probably nothing more than the lack of quality in the document. Once this committee decided to or was directed to avoid hardware standardisation it had to confront new issues that it really made little progress with. Its one worth-while suggestion is that requirements for computing equipment should be refined and a list of suitable equipment established and updated from time to time.

A final comment with thanks to COG. There was never any real grounds for suppressing this report except its quality. If you cost the six committee members' time over several weeks plus that of other parties involved the expenditure of public money in producing this document is not small. COG's persistence has let me, and you, judge whether we got our money's worth.

The BITS & BYTES Computer Book Club





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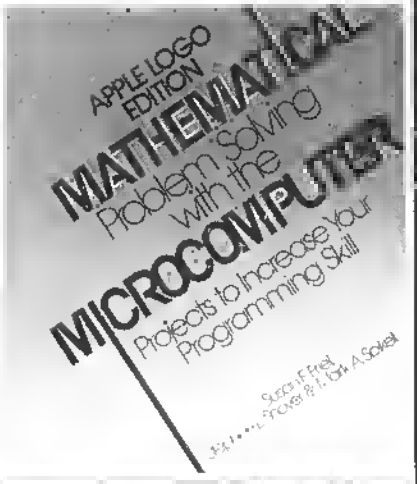

OFFER No. 1

- Mathematical Problem Solving With the Microcomputer: Projects to increase your programming skill.
- Commodore 20-64 edition — Stephen L. Snover & Mark A. Spikell.
- Apple Logo edition — Susan F. Friel, Stephen L. Snover & Mark A. Spikell. Our price: $44.90 each.
- Buy either book and each bonus point you use is worth $2 off the price.
- Buy both and each bonus point is worth $5 off the combined price.

OFFER No. 2

- Conquer the exciting PCJr and Commodore 64 kingdoms by thrilling to these original graphics games (25 in each book) compiled by Bill L. Behrendt.
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Software

All About 1, 2, 3 — Robert Schwaie & Alice Tiembour

Provides information for potential buyers of the 1, 2, 3 software package. Outlines its capabilities and a general guide to buying a managerial software package for a personal computer. Lots of examples of how it can be used.

dilithium Press — **Our price $21.40, Save $1.10 and earn 2 bonus points.**

Databases for Fun and Profit — Nigel Freestone

For users wanting to do their own programming. Provides straightforward introduction to data processing, with explanations of routines in BASIC. Examples of system designs for home and business uso, which you can combine and expand. Systems for names and addresses, catalogue/index; diary; stock control; bank account/budgeting; debtors list/sale/purchase ledger, payroll.

Granada — **Our price $18.95. Save $1 and earn 1 bonus point.**

The Best Book of Lotus 1-2-3 — Alan Simpson

While the basics of 1-2-3 are fairly easy to grasp, it takes some time and practice to extract full advantage from this large and sophisticated program. This book — easily followed with lots of graphs and illustrations — gives guidance in creating a worksheet; formatting and editing a worksheet, creating graphs; database management; macros; programming.

Sams — **Our price $25.85. Save $1.35 and earn 2 bonus points.**

Database: A Primer — C. J. Date

Dissects date end file management, focussing on how you can effectively use modern database systems and how to get the best from them. Thorough overview of databases, practical examples and exercises, discussion of widely used databases, the "how tos" of report writing, indexing and cataloguing; database design for protecting data.

Addison-Wesley — **Our price $26.00. Save $1.35 and earn 2 bonus points.**

Principles of Database Systems — Jeffrey D. Ullman

The authoritative work on database systems from Stanford University's professor of computer science. Relates database ideas to concepts from programming languages, algorithms and data structures. Large section devoted to relations, their algebra and calculus, and the query languages designed with those concepts. Also examines recently developed protocols for guaranteeing consistency in databases.

Computer Science Press — **Our price $45.35. Save $2.40 and earn 4 bonus points.**

Language/programming

FORTRAN 77: A Top-down Approach — Nonna Kliss Lehmkhul

Guide to FORTRAN with emphasis on good programming style. Assumes elementary algebra knowledge and written at student level. Deals with main topics, and gives quick access to the computer before getting involved with rules of input/output format.

Collier Macmillan — **Our price $43.65. Save $2.30 and earn 4 bonus points.**

Structured Programs in BASIC — Peter Bishop

Opens with a discussion of program structure and design. The rest of the book comprises example programs, with the complete program design process (from initial specification to final listing) carried out. Excellent source of programming techniques, algorithms, program modules, ready-to-run programs and ideas.

Nelson — **Our price $26.35. Save $1.40 and earn 2 bonus points.**

Basic Systems Analysis — Alan Daniels & Don Yeates

Background for computer programmers, enabling them to enter the fields of business and systems analysis. Assumes no previous knowledge and is suitable for business people keen to understand the use of computers in business and the problems of computerising a business.

Pitman — **Our price $19.45. Save $1.05 and earn 1 bonus point.**

The Art of Computer Programming — Donald William Drury

Covers basics of computer languages and introduces basic terms and ideas, then outlines the sequence of program development and discusses alternatives in program design. Programs are then taken in three languages — BASIC, TI 59 coding and Z80 assembler — to illustrate many of the concepts. Testing, debugging and documentation are also discussed, and a comparison is made of six versions of BASIC.

TAB — **Our price $23.70. Save $1.70 and earn 2 bonus points.**

Microsoft Basic (2nd edition) — Ken Knecht

Shows how easy it is to learn to program. A comprehensive tutorial on programming using Microsoft versions 5.0 with the TRS80/System 80 and other generalised CP/M based systems as examples. This edition has a new chapter on the Microsoft BASIC compiler.

dilithium Press — **Our price $33.70. Save $1.80 and earn 3 bonus points.**

Microsoft COBOL — Ken Seidel

An aid to understanding and using COBOL under the CP/M and MS-DOS operating systems. Intended to help you bypass the complicated writings of manuals, it describes COBOL from creation to sophistication, and presents applications pragmatically. Helps develop COBOL programming skills and a handy teaching aid. Almost every chapter has a complete COBOL program.

dilithium Press — **Our price $31.30 Save $1.65 and earn 3 bonus points**

Pascal at Work and Play — Richard S. Forsyth

An introduction to programming in Pascal, starting at an elementary level and working up to problems of realistic complexity. Approach is based on two principles – that computing is no longer a specialist subject; and that the second-best way to learn programming is to read non-trivial programs (the best is to write plenty of them).

Chapman & Hall — **Our price (hardback) $57.70. Save $3.05 and earn 5 bonus points. Our price (paperback) $24.20. Save $1.30 and earn 2 bonus points.**

Your First Basic Program — Rodnay Zaks

The author of more than 15 best-selling computer books teaches the basics of BASIC. It doesn't matter whether you're eight or 88, if you want to learn how to program a computer, this book is aimed at you. No computer experience is needed. Written in Zaks' entertaining style and attractively produced with lighthearted but telling graphics.

Sybex — **Our price $20.85 Save $1.10 and earn 2 bonus points.**

FORTH Fundamentals: Volume 1 — C. Kevin McCabe

Devoted to exploring FORTH, with a detailed examination of the language and its internal operations. Introduces fig-FORTH and FORTH-79 with full, non-technical descriptions of words and programming methods. Annotated listings of all fig-FORTH language model definitions. Numerous examples can be combined into more complex operations.

dilithium Press — **Our price $33.75 Save $1.75 and earn 3 bonus points**

Problem Solving With FORTRAN 77 — Larry Nyhoff & Sanford Leestma

Provides a complete and modern presentation of FORTRAN, but is intended as more than just a programming manual. Adopts view that the main reason for using a computer is as a problem-solving tool. Deals with problem analysis and algorithm development, transformation of algorithm into a program, and program execution and validation. Brief sketch of computer history and description of some of main features of a computer system.

Macmillan — **Our price $37.95. Save $2.00 and earn 3 bonus points.**

Apple

Data Base Management for the Apple — Nat Wadsworth

Simple, functional, cross-referenced data base management program in Applesoft BASIC allowing you to form the basis of storing and organising information on your Apple II Plus or IIe. Shows how to apply techniques to common chores, while line-by-line commentaries and variable indexes enable advanced programmer to get into more ambitious and specialised tasks.

Heyden — **Our price $26.55. Save $1.40 and earn 2 bonus points.**

Let's Talk Apple Turtle — Liddy Nevile & Carolyn Dowling

Bright and breezy introduction to what you and your Apple turtle can do together . . . talking to the turtle, controlling the screen, wrapping, cursor control, humming, repeats, rotating, spiralling hums, turtle writing, colour.

Prentice-Hall — **Our price $8.90. Save 45 cents and earn 1 bonus point.**

Applesoft for the IIe — Brian D. & George H. Blackwood

Written in Applesoft language for the IIe, it presents instructions in a lesson-type format. Rules for programming are given progressively, and programming techniques developed to advanced levels. Gives details on writing and running programs in an 80-column mode, and presents an 80-column formatter program.

Sams — **Our price $39.80. Save $2.10 and earn 3 bonus points.**

Apple II: Basic Programs in Minutes — Stanley R. Trost

Collection of versatile, ready-to-enter programs for more than 65 home and business tasks on the Apple II, II-plus or IIe. Programs for home finances, business calculations, real estate, data analysis, record keeping and education. No knowledge of BASIC programming needed to use programs which can be entered and ready to run in less than 10 minutes.

Sybex — **Our price $20.85. Save $1.10 and earn 2 bonus points.**

Shake Hands With the Apple II Plus — P. Kelly-Hartkey & J. McKneil

Individualised program for learning how to operate the Apple II Plus. All instructions relate specifically to the II Plus, although some will also apply to other Apple micros. Straightforward style assumes no knowledge of computers or jargon. Starts with simple programs and programming and progresses to graphics and word processing.

Pitman — **Our price $18.50. Save $1.00 and earn 1 bonus point.**

Applesoft Basic: A Teach-Yourself Introduction — B. M. Peake

Second edition revised to cover the Apple II Plus and IIe. A manual for New Zealanders to learn BASIC with the Apple, instead of picking information from two or three sources. Includes model answers. Enquiries for class sets welcome.

McIndoe — **Our price $13.25. Save 70 cents and earn 1 bonus point.**

Pascal Programming for the Apple — T.G. Lewis

Step-by-step guide and examples for both the hobbyist and the professional. Covers fundamentals of Pascal and demonstrates techniques for programming, graphics modules, turtlegraphics, musical tone generators and structured operations. Also many ready-to-run programs for home mortgage repayments, stock market charting and cash flow analysis.

Reston — **Our price $20.35. Save $1.05 and earn 2 bonus points.**

Programming the Apple II in BASIC — Paul Tebbe

Programs and exercises work on Apple IIe, II and II-plus without modifications. Clear progression through the programming skills with each step reinforced by exercises. After an introductory section, it covers string variables, decision making, editing, data management, bunching variables, extending arrays developing data files, using random access files, graphing, "how to do it" routines and subroutines and special programs.

Prentice-Hall — **Our price $36.25. Save $1.90 and earn 3 bonus points.**

Exploring Applesoft — Roger McShane

Teaches programming in Applesoft through a series of graduated programming tasks. Instructions are kept to a minimum – the accent is on actually working with the Apple.

Prentice-Hall — **Our price $14.90. Save 75 cents and earn 1 bonus point.**

Pascal for the Apple (book & disk) — Iain MacCallum

Provides an introduction to Pascal as a first computer language. Use your Apple to help you learn programming Pascal. Uses graphics extensively – to entertain, provide experiments and programs, and teach the serious principles of program construction. Written as a self-teaching guide for those working alone and for students. No previous experience assumed.

Prentice-Hall — **Our price $53.35. Save $2.80 and earn 5 bonus points**

Introductory

Basic Computer Knowledge — John Moss

Broadly based foundation for anyone wanting to make a career of data processing, or working in accounting, sales, personnel or production management. Covers use of computers and plans of information, coding, program storage, flow charting, programming in BASIC, software, history.

Hutchinson — **Our price $18.55. Save 95 cents and earn 1 bonus point.**

Buy now!

IBM

The IBM PC-DOS Handbook — Richard Allen King

A complete guide intended to give you confidence to be creative with your computer's capabilities. Reveals features and functions inside PC-DOS, what you can do with them, and how they go together. Second half of book shows how to become adept at using PC-DOS's more advanced features.

Sybex — **Our price $20.85. Save $1.10 and earn 2 bonus points.**

Useful BASIC Programs for the IBM PC — Stanley R. Trost

A selection of tested programs for more than 65 home and business tasks. Home finances, business calculations, real estate, data analysis, record keeping and education are some of the fields covered. No knowledge of BASIC programming is needed to use these programs.

Sybex — **Our price $18.95. Save $1.00 and earn 1 bonus point.**

Using Your IBM Personal Computer — Lon Poole

After previous popular books on the Apple II, BASIC and the Atari, Lon Poole has now turned to the IBM PC. This comprehensive book is in two parts — for those who want to use only packaged programs; and for those who have never programmed a computer but want to learn BASIC programming. Also includes familiarity chapters with the hardware, sections of graphics and sound, and summaries of BASIC, PC DOS, error messages and characters, codes and keystrokes.

Sams — **Our price $33.80. Save $1.70 and earn 3 bonus points.**

Executive VisiCalc for the IBM Personal Computer — Roger E. Clark

Guides you to fulfilling specific business needs with examples for sales analysis, forecasting, bookkeeping, accounts receivable and so on. Tips for beginners, and discussions all command statements, login functions to develop more complex and helpful models.

Addison-Wesley — **Our price $26.00. Save $1.35 and earn 2 bonus points.**

PASCAL for the IBM Personal Computer — Ted G. Lewis

Thorough guide to the two major versions of PASCAL available for the IBM PC. Written with both the experienced programmer (who will appreciate the comparison of the subtleties of both versions) and those new to PASCAL (who will find it a complete introduction) in mind.

Addison-Wesley — **Our price $32.10. Save $1.70 and earn 3 bonus points.**

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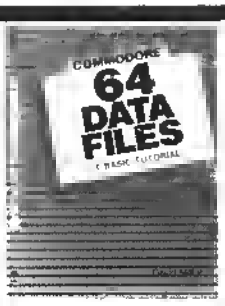

Blast Off With BASIC Games for Your Commodore 64
David D. Busch

Twenty-five ready-to-run games designed for both fun and learning. You can enter and run programs without having to know the finer points of BASIC language — while at the same time, learning BASIC programming skills. Nine games are arcade-style, the others use graphics, sound and keyboard control.

Brady — **Our normal price $27.70**

Commodore 64 Data Files: A Basic Tutorial
David Miller

From-the-beginning guide to creating your own files, offering valuable techniques and shortcuts for the advanced computer programmer. Program examples from home, hobbies, business, education and investments.

Reston — **Our normal price $32.00**

Commodore 64 Subroutine Cookbook
David D.Busch

Potpourri of machine-specific subroutines to help improve your programming expertise. Includes 70 ready-to-merge subroutines plus programming tips.Subroutines are ingredients for programming practice and learning, and are complete with line-by-line descriptions.

Brady — **Our normal price $27.70**

6502 User's Manual
Joseph J. Carr

Information for assembly and machine language programming, and performing hardware chores. Includes comparisons of micro, mini and main frame computers, and looks at applications categories for micros in general and the 6502-based machines in particular.

Reston — **Our price $34.10. Save $1.80 and earn 3 bonus points.**

Matilda, the Computer Cat
Callie Bailey Passantino

One for the kids who can follow Matilda's predicaments and adventures -- everything from lost kitten mittens to missing mice for dinner -- all taking place on the computer screen. Story unfolds through bit-sized programs and activities, accompanied by programming hints, and suggestions for parents and teachers.

Reston — **Our price $13.85. Save 75 cents and earn 1 bonus point.**

PCJr Primer: A Guide to the IBM PCJr
Steve Stein & Greg Young

Complete guide to the PCJr -- its components, how to set it up, how to run it, what makes it different from the IBM PC. Discusses printers and peripherals, the infrared keyboard, the how and why of PCJr-DOS, how to talk to other computers through the modem, and the three major pieces of software, Homeword, Home Budget Jr and Multiplan.

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The Compleat Apple CP/M
Steve Frankel

Bypasses time-consuming experimentation by answering the most common questions and correcting the most common errors. In-depth look at the similarities and differences among the three CP/M versions available for the Apple. Plus an introduction to shareware and freeware.

Reston — **Our price $27.80. Save $1.45 and earn 2 bonus points.**

Does Your Small Business Need a Computer?
Martha Eischen

Guide to deciding if you really need a computer and how to set up a feasibility study to see if computerization will help your business and on cost-effective. Advice on how much computing power you need, what the system should cost, how to choose the right hardware and software, whether or not you need an outside consultant, choosing a system to meet present and future workloads, how to install the system with the least possible disruption.

TAB — **Our price $25.60. Save $1.35 and earn 2 bonus points.**

Apple II Computer Graphics
Ken Williams, Bob & Lisa Kernaghan

Designed for Apple IIe users with a working knowledge of BASIC programming, it covers the secret of graphics techniques. Includes techniques for programming and designing popular computer games, has a section on business and technical graphics and examples in assembler language for the more advanced.

Prentice-Hall — **Our price $39.70. Save $2.10 and earn 3 bonus points.**

Our new selection

Programming the Apple II $ IIe: A Structured Approach
John L. Campbell & Lance Zimmerman

Self-study revised and enlarged edition of the Apple programming guide, with detailed information on programming capabilities and applications and presenting BASIC as a problem-solving tool. Covers program writing, guidelines and instructions for the machine, outlines of the major differences between the II and IIe, subroutines to make programming easier, plenty of code and coding examples in Applesoft II BASIC, and expanded appendices, and-of-chapter questions and summaries.

Brady — **Our price $42.65. Save $2.25 and earn 4 bonus points.**

Blast off with BASIC Games for Your VIC-20
David D. Busch

Twenty-five, ready-to-run games for both fun and learning. You can enter and run programs without having to learn the finer points of BASIC programming — while at the same time, the book teaches those skills. Nine games are arcade-style, the others use graphics, sound and keyboard control. Flowcharts show you how to play each game and how each program is written.

Brady — **Our price $27.70. Save $1.45 and earn 2 bonus points.**

Vu-Calc and Vu-File: (The Organiser): Getting Serious With Your Timex/Sinclair
Robert B.V. Masters

A concise guide to using two of the most powerful software packages for the Timex/Sinclair. Practical "how to" information on understanding and using these multi-purpose programs. Includes tear-out worksheets and two appendices showing how to customize your copy.

Brady — **Our price $38.35. Save $2.05 and earn 3 bonus points.**

Taking Off With BASIC on the Texas Instruments Home Computer
Nancy Ralph Watson

Self-paced guide to BASIC programming, designed for children and young adults, working from the simplest BASIC statements to complex ideas using just one program theme throughout. Also contains 17 supplementary chapters expanding BASIC concepts, listing of musical tones, list of the most frequently used statements and commands, and a character code chart.

Brady — **Our price $26.75. Save $1.40 and earn 2 bonus points.**

Basic Computer Simulation
Lawrence L. McNitt

Sourcebook which takes you through the specifics of modelling and creating simulations, and provides a broad range of sample programs in BASIC for use on any computer. Sixty-one programs on which to practise and learn.

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CP/M Software Review
Michael L. Gonzales

Easy-to-use rating system which evaluates and compares more than 90 pieces of software for accounting, data management, financial analysis and word processing. Each piece is rated on a four-point scale according to price range, ease of operation, documentation clarity, function, machine compatability and overall value.

Reston — **Our price $42.65. Save $2.25 and earn 4 bonus points.**

Choosing Your First Computer System: A Guide for the Growing Business
K. Ian Mitchell & Bevan J. Clarke

Written to help the manager with no computer experience to describe whether the business needs a computer and if so, which one, what sort of computer services will be best, and how to manage selection and installation. Straightforward style helps remove the complexity from these problems.

Pitman — **Our price $6.60. Save 35 cents and earn 1 bonus point.**

Word Processing with your Microcomputer
L.R. Schmeltz

Comprehensive introduction to word processing, taking you from a discussion of the whys and hows through a look at word processing programs and systems, hardware to a practical assessment of how you can use it and whether or not your need word processing capabilities.

TAB — **Our price $30.35. Save $1.60 and earn 3 bonus points.**

What To Do When You Get Your Hands on a Microcomputer
Charles P. Holtzman

Easily-read, fun introduction to computer programming. Suitable for any age, it's written in a crisp, lively format using cartoon-type drawings to explain the BASIC language and show how it can be used on any small computer. Also includes advanced information on compilers, tips on planning a career in computing and tongue-in-cheek advice on how to get the best from your computer, programs and programming efforts.

TAB — **Our price $23.70. Save $1.25 and earn 2 bonus points.**

Understanding the Macintosh Computer
Rick Dayton

What can a Macintosh do? How does it operate? What are the meanings and uses of the Mouse? Windows, electronic spreadsheets, word processing and high resolution graphics on the Macintosh? Just some of the questions answered. And how to get the most from the software packages -- MacPlan, MacWrite, MacChart and MacPaint.

Our price $40.15. Save $2.15 and earn 4 bonus points.

Books help you get the most out of your computer

Introduction to Computer-Based Accounting with applications for Apple II, TRS-80, Commodore PET
Wennie van Lint, Allan Miller & Brian Belchet

After introducing computers and BASIC language, there is an up-to-date presentation of accounting topics, printed listing of programs for practice completion and problems which can be run to accompany the book.

Prentice-Hall — **Our price $16.35. Save 85 cents and earn 1 bonus point.**

A Course on Programming in FORTRAN (2nd ed)
Valerie J. Calderbank

Easily followed text aimed at those with only an elementary knowledge of mathematics and a basic understanding of the principles of computing. Particularly suitable for science, engineering and computer science students but also fits the needs of experienced programmers. Incorporates FORTRAN 77. Each chapter concludes with problems and solutions.

Chapman & Hall — **Our price $20.85. Save $1.10 and earn 2 bonus points.**

On-Line Computing for Small Businesses — Silver's Wall
Maurice A. Silver, John Jeacocke & Ray Welland

Sets out to provide managers of small businesses with a clear, concise but non-technical instruction in the use of on-line computing based on the practical experience of the authors. No prior knowledge of computing essential and only essential technical definitions are included.

Pitman — **Our price $9.95. Save 55 cents and earn 1 bonus point.**

Commodore

Basic Subroutines for Commodore Computers — Eddie Adams

Easy-to-use manual which offers access to more than 300 BASIC subroutines — powerful building blocks you can combine and adapt to create programs for a wide range of business, educational and personal applications. Explanations for each subroutine with suggestions for modifying it to your needs. Each program is ready to run on any Commodore system.

Wiley & Sons — **Our price $30.35. Save $1.60 and earn 3 bonus points.**

How to Use The Commodore 64 — Jerry & Deborah Willis

Introduction to the computer and its basic components, explains what the components do and how they work together, step-by-step instructions on setting up and installation, shows how to load and save programs on diskette or cassettes, tells how to type in, use and modify programs, presents other sources of information.

dilithium Press — **Our price $8.55. Save 40 cents and earn 1 bonus point.**

More Than 32 BASIC Programs for the Commodore 64 Computer — Tom Rugg & Phil Feldman

Chock full of programs covering games, applications, education, graphics, mathematics. Each program is fully documented with a complete source listing, the program's purpose and how to use it. Also information on how to adapt programs by making simple modifications.

dilithium Press — **Our price $45.55. Save $2.40 and earn 4 bonus points.**

Challenging Games for the Commodore 64 — William A. Roberts

Just about everything . . . enemy blasters, outwit the computers, shoot-outs. All 16 are designed for excitement from Caverns of Terror and Tunnels of Thor to Warlock's Castle and Blackout.

Pitman — **Our price $18.95. Save $1.00 and earn 1 bonus point.**

How to Program the Commodore 64 — if you've never programmed a computer before — Robert Young

After an introduction to the bits and pieces of the 64, you move to the process of learning to program on the keyboard. Concentrates on the key words and technique to have you writing programs as quickly as possible, then allow you to tame the process at your leisure.

Interface — **Our price $21.80. Save $1.15 and earn 2 bonus points.**

Basic Commodore 64 BASIC — James S. Coan

An easy-to-read guide to computer operation and BASIC programming. Simple, direct approach involves mastering short programs, then adding a new command and watching as the program is created and illustrated. You then move on to another capability. Programs are divided into manageable segments, and special features and advanced programming techniques are explained.

Heyden — **Our price $30.35. Save $1.60 and earn 3 bonus points.**

Sinclair

I Wish I Knew . . . about the Spectrum & ZX81 — Jonathan Chapple

A book to help both parents and children grasp the basic ideas of computing and provide an elementary knowledge of programming in BASIC language. Both can learn together through a "come-on" visual approach effectively laid out and easy to follow.

Pitman — **Our price $17.05. Save 90 cents and earn 1 bonus point.**

Thirty-four Amazing Games for the 1K ZX81 — Alastair Gourlay

Claims to be more than just a games collection; maintains it's a guidebook to show you how to make the most of your 1K ZX81. Invites you to enter programs, then improve and modify them with your own stamp. And you can use the author's compressing tricks on other programs.

Interface — **Our price $16.85. Save 90 cents and earn 1 bonus point.**

Sixty Games & Applications for the ZX Spectrum — David Harwood

Games and utility programs, all in ready-to-run form. All programs have been dumped directly on to the ZX printer to avoid problems of getting them up and running within seconds of typing them in.

Interface — **Our price $18.85. Save 90 cents and earn 1 bonus point.**

Spectrum Magic: Your First Programming Book — Steve Bells

Bright, simple book packed with fun cartoons, which introduces budding programmers to the keyboard, then moves on to programs, programming and BASIC, showing how the computer works and how to make it work for you. Aimed at children but suitable for any beginner.

Foulsham — **Our price $15.70. Save 80 cents and earn 1 bonus point.**

Programming Arcade Games for your Spectrum — Adrian Jones

Looks at what makes an arcade game and studies techniques used in their development and production. In-depth look at more sophisticated methods of programming, including brief look at using machine code to speed up and improve programs. Followed by complete breakdown of 10 arcade games and how they can be simulated on the Spectrum.

Foulsham — **Our price $15.45. Save 80 cents and earn 1 bonus point.**

Seventy Games for the Timex/Sinclair 1000 & 1500 — Tim Hartnall

Ready-to-run programs for all programming levels from the master gamesman. Thrill to intrigue, driving games, board and card games, music programs, word and letter games, and educational programs.

Addison-Wesley — **Our price $19.90. Save $1.05 and earn 1 bonus point.**

Instant Spectrum Programming: How to Program the Spectrum in just 60 minutes — Tim Hartnell

A true bargain from one of the master computer writers . . . a C-60 instructional cassette backed by the complete text of the tape and 19 demonstration programs. Plus a further 30 games, utility and graphics programs.

Interface — **Our price $17.05. Save 90 cents and earn 1 bonus point.**

Atari

BASIC Exercises for the Atari — J.P. Lamoitier

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BBC

The Book of Listings: Fun Programs for the BBC Microcomputer — Tim Hartnell & Jeremy Ruston

Range of programs covering arcade action games through board games to tax your wits to some startling graphics demonstrations and some utilities. Many programs run on both models A and B, and all are discussed and documented. Explanations of how to play, modify and extend the programs, and advice on practical programming.

BBC — **Our price $12.80. Save 70 cents and earn 1 bonus point.**

36 Challenging Games for the BBC Micro — Tim D. Rogers & Chris Callender

Entertaining selection ranging from graphic adventure programs to fast-moving arcade action. Brief description of each game, outline of how it works, length in bytes and any modifications necessary for running on a model A are given.

Interface — **Our price $20.45. Save $1.10 and earn 2 bonus points.**

General

The A to Z Book of Computer Games — Thomas C. McIntire

Popular collection of 26 game programs ready to run on any machine which uses BASIC. Programs also provide excellent technique practice if wanted. Wide variety of games. And you can choose your opponent — human or the computer!

TAB — **Our price $21.40. Save $1.10 and earn 2 bonus points.**

Giant Book of Computer Games — Tim Hartnell

More than 40 games compatible with Microsoft BASIC and able to run on most micros, including BBC, VIC-20, Oric, Apple II, Commodore 64, IBM PC, Dragon 32, Tandy Color, TRS-80, Spectrum, T/S 2000, VZ200 and Texel. Wide choice of board, adventure, dice, space and brain games, with an explanation of how they work and possible modifications.

Interface — **Our price $27.50. Save $1.45 and earn 2 bonus points.**

The Computer Book: An Introduction to Computers and Computing — Robin Bradbeer, Peter de Bono & Peter Laurie

The book which has taken Britain by storm . . . written for the lay person in plain English to explain what computers can do, how and why they were developed, and how they work. Looks at problem solving, provides an introduction to programming, explores how the micro can be used as tool in many areas, and looks into crystal ball about the direction and limitations of this technological revolution.

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Background to the secrecy

By Nick Smythe

In 1982, at great expense and amid feverish interest, the Department of Education in conjunction with the State Services Computer Services Division set out to provide the evaluation of computers in schools. This followed earlier, abortive moves to provide funding for school computing using the Poly computer produced in New Zealand. Involvement in Poly included the Development Finance Corporation, Wellington Polytechnic, and the software house, Progeni.

Pressures from other interests in the computing field led to calls for an evaluation exercise for school computer equipment at the same time as expenditure cuts removed all likelihood of actual Government funding. The resulting evaluation exercise was confidently expected to yield a recommendation for a single computer, many observers expecting that the conclusion would earmark the Poly as the chosen machine (the specifications for the exercise were extremely close to those on which Poly was designed). After a Herculean labour the final outcome was a single, A4 sheet sent out to schools and naming five approved micros. The full report was suppressed for a variety of reasons.

The Official Information Act has been passed to regulate the conditions under which public (i.e. State) information should be made public (i.e. generally accessible). Under its terms individuals and organisations may seek the release of public documents.

Because of the considerable preference for anonymity in many Government departments the progress of this act in operation has been keenly watched. Full of enterprise, several individuals and organisations (including the Post-Primary Teachers' Association) sought to uncover the mystery of the computers-in-school reports and requested copies under the Official Information Act. The Department of Education blocked release, for reasons discussed below. The parties seeking the report appealed to the Ombudsman, who upheld their appeal and requested release of the report. The Minister of Education, Mr Wellington, exercised his Ministerial veto, over-ruling the Ombudsman.

Among the material released just before the report was finally made public last month were several files and letters relating to Cabinet decisions and departmental correspondence with interested firms. These yield some interesting insights into behind-the-scenes lobbying and manoeuvring. They also yield some interesting sidelights on the attitude of the Department of Education to releasing the report and the reasons it gave for withholding information.

The complete evaluation report was withheld on three grounds:–

1: That the information contained in the report was supplied in confidence to the Department of Education. This appears to draw

upon concepts related to confidential tendering and partly on related issues of the sensitivity of technological information.

2: That the protection of the information was otherwise in the public interest. The argument here was that by the time the request for release was answered (late 1983) the information was so dated as to be worthless, and in fact would confuse the schools, who might read into the report conclusions that passing time had outdated. This does not only imply schools (and particularly the highly motivated teachers fund-raising for computer purchase) are incapable of evaluating evidence and appreciating the pace of change, it also makes reason one, on confidentiality, virtually untenable.

3: That similar information might not be provided by firms in future if the report were released. (Can anyone give me the name of a company that would exclude itself from evaluation from such a strategic market in a re-run of this exercise?)

There are other reasons why the confidentiality clause is inappropriate. The most significant is that in several places in released documents it is made plain that the evalution exercise was just that: a call for technical information. A letter to CED specifically states that this was the case. It was not a confidential tender. Only a single supplier (MDL, dealing with the BMC) sought any assurance of confidentiality. This was out of 13 tenderers (eight apparently did not make it to the short list). In spite of departmental assertions that several firms requested confidentiality this single request is the only documentary evidence produced.

These reasons for suppression do not stand scrutiny, as the Ombudsman's decision that the report should be released clearly agrees. Why was the report suppressed? Some pointers to some odd practices now follow.

POLY BUT NOT THE PUBLIC

Confidentiality is a key concern to the Department of Education. Yet confidentiality arguments take another blow when it is realised that two reports were produced. Apart from the full report, a draft summary for widespread circulation was drawn up. This document never saw the light of day . . . except it did get sent to Polycorp, the manufacturer of Poly computers.

Here we have a document which, in spite of MDL's requests for confidentiality, was sent to a commercial rival for appraisal, but was still not considered suitable for public circulation.

This inconsistency is magnified when we realise that the MDL letter requesting confidentiality specifically named Polycorp as a serious concern: a reason for requesting confidentiality was specifically stated as being to guard against Polycorp getting access to its submission.

It is interesting that of the five early applications for release of the full report under the Official Information Act the only participant company seeking release was Polycorp.

Poly itself was, incidentally, hardly happy that while on loan to the Department of Education one of its confidential development systems was proudly exhibited to the Pacific sales manager of one of its expected rivals: Digital Equipment. It is plain that Poly and the Development Finance Corporation also felt that contacts during 1981 with the Department of Education (along with the 1978 National Party election manifesto) gave it hope for preferment, an attitude the Department of Education distanced itself from in a letter from the Minister to Progeni in 1982. The Cabinet committee on expenditure felt that school purchase of equipment was running ahead of actual policy on the role and cost-effectiveness of computers in school. Notwithstanding this it clearly later (during the evaluation period) sought (quite properly from a trade standpoint) to assist Poly in its export markets by seeking to communicate its acceptance as "a" (if not "the") recommended school machine at an early a date as possible.

STANDARDISATION OUTCOME

The outcome was that software standardisation, rather than hardware standardisation, would be used as a means of providing unity to the educational system. This was the most severe blow to Poly, the firm most requiring an unfragmented hardware market. Given the diverse operating systems and languages of the machines in the exercise this is a stunning (not to say irrational and, with 8-bit machines, uninformed) shift in emphasis. The legacy of the confusion caused by that shift will endure for some time.

The Official Information Act also has its lighter sides. One document returned, dealt with a legal opinion (suppressable under the act) on the evaluation exercise. As released it consists virtually of a greeting, a large pasted-out middle, and a "yours sincerely". More revealing is a departmental memo to Mr Wellington outlining the background to the requests for release of the report. A single sentence highlights the barriers to the effective access to information: "The Department has been giving careful consideration to whether the report can be withheld or whether it must be released". How much the two highlighted words reveal, and how nice it would be if the must and can were swapped, showing that the desire was to release unless constrained rather than to withhold.

[Bits & Bytes thanks Mr W.J. Rosenberg, of Christchurch, for his efforts in obtaining release of this information, and for making the documents available to this magazine. — Editor.]

Figure 1 COMPARISON CHART

	TRS 80	Poly	NEC	Monroe	Hitachi	BMC 800	BBC Micro	Apple
Networking		**	**			***	**	***
BASIC - Editor	*	***	***	**	***	***	**	*
- Language	***	**	***	**	***	***	**	*
PASCAL - Editor		*	***			***		***
- Language		*	***			***		***
Colour	--	**	**	***	**	***	***	*
Graphics	--	**	**	***	**	***	**	*
Sound	--	**	--	**	--	***	***	*
Keyboard	**	**	**	***	***	***	**	*
Mix 1 - all Basic		ø	ø			ø	ø	ø
2 - all Pascal		x	ø			ø		ø
3 - mix Basic/Pascal		ø	ø			ø		ø
4 - loading same		ø	ø			ø	ø	ø
5 - loading different		x	ø			ø	ø	ø
6 - writing disk		x	ø			ø	ø	ø
7 - writing printer		x	x			ø		ø
8 - any		x	x			ø		ø
Cost of minimum standalone unit	$2106 BLACK/WHITE ONLY	$3890	$3635	$3275	$2018	$2330	$1376	$2000
Cost of colour system - 10 units in network	$28260	$44837	$56270 $41515	$44515	$38347	$29800	$31973	$37230
Reliability during tests	***	*	***	***	***	**	***	***

KEY : * Poor
** Satisfactory
*** Good
-- not available
x failed
ø passed

Costs : Based on suppliers' figures
Some have education/bulk discount

1982

REPRODUCED FROM THE EVALUATION

A first look at graphics

By Gordon Findlay

Once upon a time, a long time ago, there was no such topic as 'Computer Graphics'. Graphics were things made with a silk screen and ink, and were the domain of artists and advertising writers. Computers were number-oriented machines, although a few could cope with names and addresses.

But that was in the bad old days (say the late '50s). Today, the word, 'graphics', conjures images of games: arcade games, adventure games, even pornographic games, so help us. But many beginners, and even some old hands that I have spoken to, have trouble with the jargon of graphics. Advertisers, especially in the glossies, have done a lot to blur distinctions. Let's look at the graphics field this month, and see what really is what.

Almost all home computers have some sort of facility for pictorial displays. These range in quality, sophistication, and practicality, varying in several important parameters from machine to machine. But why? Surely it isn't just game playing? Of course not. Even three years ago a graphic capability was regarded as frivolous in a business machine. The situation is a little different today! Users have appreciated that the use of graphs, charts, and pictures can make information more comprehensible and much quicker to grasp. A graph makes trends obvious, a pie chart is easier to understand than a table of percentages. In education, a diagram is worth many more than a thousand words of explanation. The operation of the computer itself can be made almost transparently obvious by means of a graphical simulation of a desk, as carried out with wondrous effect in Apple's Lisa and Macintosh, and not quite so well in a host of imitations.

The most obvious first parameter when considering a graphics display is the number of colours which can be displayed. Black and white are two! Of course having a colour-generating computer is one thing and having a colour-showing screen is another. Using the TV set is sometimes a possibility, although Pacman does tend to make Coronation Street difficult to see. A separate colour monitor will cost $600 to $900, which is perhaps more than the computer itself. The colour or black and white decision won't cause concern anyway – there are few B & W only machines left.

Eight or 16 colours seem to be the most common choices. Associated with colour is "shade" or "luminance" within a colour; different machines use different words to describe these variations. Some computers generate much better colour than others – much deeper and purer colour, not washed out like some.

The resolution of a display is a measure of the size of the lumps which can be displayed. The higher the resolution, the more "block" the screen is divided into. The System 80 has a resolution of 128 by 48, which means that the screen is divided into 128 pieces horizontally, and 48 vertically. This is a relatively low resolution these days, leading to coarse, lumpy displays, with obvious

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steps in place of lines. A resolution of 640 by 240, which is commonly found, is much finer. The steps are still there, but much smaller and less obvious.

There are many ways of designing a computer. Some require much more hardware than others: the 640 by 240 display with 16 colours might need an extra 48K of RAM just for video. There are several sorts of graphics, too.

A computer with character graphics has the ability to display certain fixed shapes. These shapes are treated just like letters of the alphabet, but might be a diamond, a short diagonal line, or whatever. The Commodore machines were among the first to show a range of graphics characters on the keyboard. More recently provision has been made in many computers for the user (or programmer really) to define or alter these characters.

''Pixel graphics'' refers to the ability to turn individual blocks on the screen on or off. The word, ''pixel'', comes as a contraction of ''picture element'', and means the smallest element of the screen which can be manipulated. The higher the resolution, the smaller the pixel. Usually, but not always, the pixel is square.

Some machines have a number of ''modes'', or different resolutions. Generally speaking, the higher resolution modes have fewer colours, or a different shaped pixel, or some combination of trade-offs.

''Shape table'' graphics was invented, I presume, by the designers of the Apple. A shape is a collection of pixels, which may be drawn all at once. The shape might be a collection of pixels which looks like a space invader, say. Shapes must be defined (described) and may then be drawn as whole, rather than pixel by pixel. This is usually much faster, and is always much easier programming. Some programming languages will allow the shape to be rotated differently as it is drawn, or changed in size.

SPRITES – SHAPES THAT MOVE

Give a shape a speed and direction and of course it will move. It will also change its name – it becomes a sprite. A sprite is basically a shape which is moving against some background. Sprites should al have a priority, so that when tw meet it is clear which one tak precedence and is displayed. Th gives an illusion of one sprite movi behind or in front of another. Som very complex animations have bee done this way.

The original meaning of the wor ''sprite'', and still I think the on legitimate one, required sprites t have a shape, to be able to be set i motion, and to have priority as described in the last paragraph. Bu beware! There are machines whic claim sprites, but with a loose definition – usually without th priority attribute, or without th ability to move.

One of the earliest implementatio of sprite graphics was in the Ata 400 and 800 series, under the nam ''player-missile graphics''. This wa obviously intended for game programmers, and great things hav been done with them.

Programming for graphics may b a pleasure or agony, depending o the support given by you programming language. Assumin that your machine has some form o pixel graphics at least, you will find PLOT or SET statement to turn on a

individual pixel. You may also have statements for drawing lines, such as VLIN and HLIN in Applesoft. If you are lucky you may have more powerful statements, for drawing triangles, rectangles, polygons, or even circles. If you are really lucky you may have the ability to FILL or PAINT a whole region on the screen with just one line of code. These facilities may be provided through BASIC extensions, or perhaps by PEEKing and POKEing. This is a matter of personal preference, but some versions of BASIC certainly make things easier than others.

A more recent acquisition to the programmer's armoury has been the idea of Turtlegraphics, where commands are given to an imaginary Turtle, which draws your picture for you. This is the idea used in the graphics portion of Logo, which has become so famous. Other languages also use the idea – some versions of Pascal, and some of BASIC even . . .

Don't think as so many do that Turtlegraphics, and the more common pixel and line oriented commands are necessarily separate. A language might support a mixture as the BASIC for the BMC machines does. This gives the best of both worlds.

If you are going to program using graphics, find out what utilities are available for the machine you are using. There are lots of them around, and they often give you much more power by letting you use the clever ideas of somebody else, or by speeding up your programming. I have only once made up an Apple shape table by hand. "Been there, done that, didn't like it." This involved plotting a series of vectors to describe each shape, assembling them into bytes, indexing the table and so on, remembering a lot of important, but petty, restrictions about what can follow something else and so on. A terrible task, but one which can be automated by a program which allows you to move a dot around the screen, drawing as you go, and constructing the shape table as you move. Without it I doubt whether I would ever again have used shape tables.

Find out what is around to buy, swap, or type in from magazines, and use them.

DISKS 3

Operating Systems

By Gerrit Bahlman

Every piece of machinery (hardware) associated with a computer system is so stupid that it needs a human being to turn it on. What is more to the point that turn on has to be so specific that it takes expert programmers hundreds of hours to decide how everything is to be turned on. The special software needed to drive a computer system must instruct the central processing unit what is available, how it is all to be treated, what is to be done when, etc, etc.

The general name for this organisational software is the operating system. This is a huge piece of software that can take a substantial proportion of a machine's capability. In one commercial machine, the PDP 11/03, which has 64K of addressable memory, the operating system takes about 70 per cent of the available space, depending on the number of peripheral devices and the high-level language being supported.

In the micro machines the operating system can be relatively simple. Often the only peripheral devices being supported are a disk unit and visual display unit. These have their own attached hardware cards designed to carry the burden of their operating instructions.

As always, different machines, different set of instructions. There are a few brave souls who have recognised that having the same apparent operating system running on different machines ought to allow the same application program to run on different machines. By far the most popular operating system is CP/M, from Digital Research. CP/M stands for "Control Program for Microcomputers" and is available for both 8-bit and 16-bit machines. CP/M is a single-user operating system, which means that it is able to control only one machine to be used by one person. There are multi-user systems also, for example, MP/M, which is the specific version developed from CP/M. UNIX and Oasis are examples of other operating systems.

One of the functions of these programs is to control the disk unit, to allow information to be written to and read from the disk surface. The disk operating system is also found separate from the operating system. The Apple II and *//e* are examples of this. Their disk operating system, called DOS, actually resides on the disk and is loaded into the computer's memory when the machine is turned on. The operating system to control the rest of the computer is present in ROM memory and is effectively invisible.

The bug-bear for all commercial programmers is the theft of software. If you have spent 600 hours writing a wordprocessor program and you then market it there is nothing to stop someone coming along and copying it. This is especially true where a general operating system like CP/M is concerned. Because the operating system is common the program can be made to operate on different machines relatively easily. Consequently programmers write parts of their program so that it is machine specific. In other words the program uses some physical characteristic of a machine type which makes the transfer to another machine difficult.

Usually, a simple adaption program can be run to alter the program so that it becomes specific to another machine type. Not surprisingly, the software marketers tend to retain that program. Licence numbers and the incorporation of the purchaser's name in the software is another way in which software is guarded. If you are prepared to fiddle with a piece of such software you can get some ugly surprises when you change so much as a single letter in the purchaser's name. The software can be made to check that it hasn't been fiddled with and if it has it just will not work. In the case of the Apple II, *//e* computers the DOS is often altered on the disk with the program being sold to prevent it being copied.

Let us look at the disk operating part of the operating system and examine in general terms what that software must do.

The programmer or program user simply wants to give the computer a name of a file that is stored on the disk to allow reading or writing to occur. One thing is for sure: no way do you want to get involved in remembering where, in terms of tracks and sectors, the file is. You probably do not want to get involved in turning on electric motors for the correct length of time to position the read/write head and to spin the disk. In the broadest terms that is the function of the disk operating system. You give it a file name and order access to the disk and then the disk operating software does the nitty gritty work with read/write heads and file location.

In the next article I will look in detail at some of the strategies used to access information stored on disk; how the disk operating system finds where a file is regardless of its size; how the disk operating system copes with files that don't fit on to the gap left for them and what it can do to allow a file to be split into parts with the parts stored in different places.

Spectravideo

Bouncing Ball

This program by Nigel Burrell, aged 16, of Oamaru is for the Spectravideo 318 and 328. It uses sprites, which, he says, "on other computers need to be POKEd in."

Lines 40 to 80 read and shape the sprite by using the data from line 90 to 160. The 0's represent unplotted pixels while the 1's represents plotted pixels.

"You can make up to 32 sprites on the Spectravideo computer, either different or the same-shaped," writes Nigel.

"The PUT SPRITE command in the listing prints the sprite at A, B co-ordinates.

"Try making the sprite change colour when it bounces or even change the shape of the sprite by putting in different data starting at line 90."

```
10 CLS
20 INPUT "Colour Code of the ball";COL
30 SCREEN 1
40 FOR T=1 TO 8
50 READ A$
60 S$=S$+CHR$(VAL("&B"+A$))
70 NEXT T
80 SPRITE$(0)=S$
90 DATA  00111100
100 DATA 01111110
110 DATA 11111111
120 DATA 11111111
130 DATA 11111111
140 DATA 11111111
150 DATA 01111110
160 DATA 00111100
170 B=100
180 B=B+W:PUT SPRITE 0,(A,B),COL,0
190 W=W+.1
200 IF B>191 THEN 220
210 A=A+1:GOTO 180
220 PLAY"L64O1C"
230 B=191
240 W=W-.1
250 B=B-W:PUT SPRITE 0,(A,B),COL,0
260 IF B<100 THEN 170
270 A=A+1:GOTO 240
```

TRS-80 Color

This program by D. Rogers, of Christchurch, is for the TRS-80 Color Computer with extended BASIC, and should run on a 16K machine. "It will run on a non-extended BASIC CoCo if the play statements are changed to sound statements," writes Mr Rogers.

```
REM *** BY DENNIS ROGERS
UARY 1984
10 Z=0:S=0:CLS3:X=0:FORY=0TO31:SET(X,Y,2):NEXT:Y=31:FORX=0TO63:SET(X,Y,2):NEXT:X
=63:FORY=0TO31:SET(X,Y,2):NEXT:Y=0:FORX=0TO63:SET(X,Y,2):NEXT
15 A$=CHR$(128):PRINT@105,A$+"snake"+A$+A$+"trap"+A$+"";:PRINT@199,A$+"by"+A$+"d
ennis"+A$+"rogers"+A$+"";:PRINT@233,A$+A$+"christchurch"+A$+"";:PRINT@266,A$+"ne
w"+A$+"zealand"+A$+"";:PRINT@329," JANUARY, 1984 ";
20 W$=INKEY$:IF W$="" THENPRINT@420,A$+"want"+A$+"instructions"+A$+"(Y/N)";:PLAY
"L15005AB":GOTO20 ELSEIF W$="Y" THENGOSUB200 ELSEIFW$="N" THEN25ELSE20
25 CLS2:Y=2:FORX=0TO63:SET(X,Y,1):NEXT:X=0:FORY=2TO31:SET(X,Y,1):NEXT:Y=31:FORX=
0TO63:SET(X,Y,1):NEXT:X=63:FORY=2TO31:SET(X,Y,1):NEXT
30 PRINT@164,A$+"press"+A$+"s"+A$+"to"+A$+"start"+A$+"game"+A$+"";:PRINT@194,A$+
"and"+A$+"the"+A$+"arrow"+A$+"keys"+A$+"to"+A$+"move"+A$+"";
35 W$=INKEY$:IF W$="" THENPLAY"L8005AFA":GOTO35 ELSEIF W$="S" THEN40 ELSEIF W$<>
"S" THEN30
40 X=20:Y=20:PRINT@164,STRING$(23,143+16);:PRINT@194,STRING$(23,143+16);
45 I=RND(20):U=RND(100):PRINT@0,"SCORE";S:PRINT@18,"HI-SCORE";V:S=S+1
50 FR=RND(3):IF FR=3 THENG=RND(63):H=RND(31)ELSE70
55 IF G<2 OR G>60 OR H<4 OR H>29 THEN50 ELSESET(G,H,8)
60 IF I=20 THENSET(G,H,4)
65 IF U=100 THENPLAY"L5003ADDC":SET(G,H,7)
70 H$=INKEY$:IF H$="" THENH$=B$
75 B$=H$
80 IF H$=CHR$(8) THENX=X-1:GOTO100
85 IF H$=CHR$(9) THENX=X+1:GOTO100
90 IF H$=CHR$(94) THENY=Y-1:GOTO100
95 IF H$=CHR$(10) THENY=Y+1:GOTO100
100 IF POINT(X,Y)=1 OR POINT(X,Y)=8 THENPLAY"L5503CBABCACBABCACAL50ABABABABAB":G
OTO120
105 IF POINT(X,Y)=4 THENPLAY"L5005ACACACACACACACA":S=S+RND(100)
106 IF POINT(X,Y)=7 THENPLAY"L5504GFFGFFGFFGFF":S=S+500
110 PLAY"L25504ABBC":SET(X,Y,3)
115 GOTO45
120 A$=CHR$(128):CLS8:PRINT@100," YOUR SCORE WAS ";S;:IF S>V THENV=S:PLAY"L10005
AFFAFFAFFAFFAFFAFFAFFAFFAFFAFFA":PRINT@161,A$+"your"+A$+"new"+A$+"hi"+A$+"sco
re"+A$+"is";V; ELSEPRINT@163," YOUR HI SCORE IS ";V;
140 Q$=INKEY$:IF Q$="" THENPRINT@290,A$+"want"+A$+"to"+A$+"play"+A$+"again"+A$+"
Y/N";
150 IF Q$="Y" THENGOTO10
160 IF Q$="N" THENCLS:END
170 GOTO140
200 CLS:PRINT@10,"INSTRUCTIONS":PRINTSTRING$(32,"=")
210 PRINT"THE OBJECT OF THIS GAME IS TO   MOVE A LINE AROUND  THE SCREEN  AND TR
Y TO GET  AS HIGHER SCORE AS POSSIBLE,  USING THE FOUR     ARROW KEYS. IF YOU HI
T THE     BOARDER OR THE ORANGE DOTS THE  GAME ENDS."
220 PRINT"AS YOU MOVE YOUR LINE YOU EARN  1 POINT EACH TIME. YOU MAY ALSO  GO TH
ROUGH YOUR LINE WITHOUT    ENDING THE GAME" :PRINT:INPUT"PRESS <ENTER> TO CONTIN
UE";P$
230 CLS:PRINT:PRINT:PRINT:PRINT"HERE ARE THE OBJECTS THAT YOU   MAY HIT TO EARN
EXTRA POINTS:->"
240 PRINT:PRINT" "CHR$(143+48)" - IS WORTH UP TO 100 POINTS":PRINT" "CHR$(143+96
)" - IS NORTH 500 POINTS"
250 PRINT@480,"":INPUT"PRESS <ENTER> TO START GAME";S$:RETURN
```

PROGRAMS

Colour Genie

This program by David John will compute a sports draw where each team will play every other team.

It can be readily adapted for other microcomputers.

```
10 'This program will compute a sports draw where each team will play
every other team. Written by DAVID JOHN
20 CLEAR500:CLS:PRINT"TEAM DRAW"
30 PRINT:PRINT:INPUT"NUMBER OF TEAMS";N
40 DIMT$(N+1),G$((N+2)/2):IFN/2=INT(N/2)THENO=1:E=1:ELSEO=2:E=0
50 PRINT:FORI=1TON
60 PRINT"TEAM NAME";I;:INPUTT$(I)
70 IFLEN(T$(I))>16THENPRINT"NAME TOO LONG":GOTO60
80 T$(I)=T$(I)+STRING$(16-LEN(T$(I)),"."):NEXT:T$(N+1)="THE BYE"
90 FORR=1TON-E:CLS:PRINT"ROUND";R:PRINT:PRINT
100 FORI=1TO(N+1)/2:G$(I)=T$(I)+" Vs "+T$(N+O-I):NEXT
110 IFO=2THEN140
120 S=INT(RND(N/2)):IFS=0THEN120
130 TEMP$=G$(1):G$(1)=G$(S):G$(S)=TEMP$
140 FORI=1TO(N+1)/2:PRINTG$(I):NEXT
150 TEMP$=T$(1):FORI=1TON-1-E:T$(I)=T$(I+1):NEXI:T$(N-E)=TEMP$
160 PRINT:PRINT:PRINT"Press ANY KEY to continue"
170 K$=INKEY$:IFK$=""THEN170
180 NEXT:RUN
```


ZX81

Art Work

Our Sinclair editor, Steven Baker describes this program by Alistair Matthew, aged 13, of Wellington, as an excellent effort. "It's a great change to see people writing games other than Space Invader types," says Steven.

Alistair says this art program, which requires 16K uses Key 0 for clearing the screen and leaving cursor where it was. Other keys work thus

```
1   7   4
5       8
2   6   3
```

That is, to go to the top right of the screen, key 3; to go to the bottom left, key 2; etc.

Lines 10 and 20 set up the variables.

Lines 30, 40, 140 and 150 check whether you want the screen cleared to go in or out of rub-out mode.

Lines 50–60 and 110 and 120 check which way you want to draw.

Line 70 draws.

Lines 128 and 130 make the cursor flash while in rub-out mode.

You cannot rub-out diagonally, although by editing lines 51–58 and changing them to lines 131–148 and leaving lines 51–58, this could be done.

```
  10 LET X=20
  20 LET Y=20
  30 IF INKEY$="0" THEN CLS
  40 IF INKEY$="9" THEN GOTO 110
  50 LET X=X+(INKEY$="8")-(INKEY
$="5")
  51 IF INKEY$="2" THEN LET Y=Y-
1
  52 IF INKEY$="2" THEN LET X=X-
1
  53 IF INKEY$="3" THEN LET X=X+
1
  54 IF INKEY$="3" THEN LET Y=Y-
1
  55 IF INKEY$="4" THEN LET X=X+
1
  56 IF INKEY$="4" THEN LET Y=Y+
1
  57 IF INKEY$="1" THEN LET X=X-
1
  58 IF INKEY$="1" THEN LET Y=Y+
1
  60 LET Y=Y-(INKEY$="6")+(INKEY
$="7")
  70 PLOT X,Y
 100 GOTO 30
 110 LET X=X+(INKEY$="8")-(INKEY
$="5")
 120 LET Y=Y+(INKEY$="6")-(INKEY
$="7")
 128 PLOT X,Y
 130 UNPLOT X,Y
 140 IF INKEY$="0" THEN CLS
 150 IF INKEY$="9" THEN GOTO 30
 160 GOTO 110
```

ZX81

Hangman

This version of Hangman from G. Morrow, of Taupo, requires 16K RAM. It is for two players. Player one is asked to input a word, while player two looks away. The computer then places a series of dashes on the screen, one for each letter of the word, and lays the foundations of a gallows. Once the prompt under the guess word message is activated, player two presses the key for the letter chosen. A correct letter is placed in the series of dashes, while an incorrect choice is printed at the bottom of the screen and the next stage of the gallows is built. A flashing letter shows that you have already tried this letter, and it is then regarded as an incorrect letter.

When the word is complete, or the player is "hanged," the answer is flashed for several seconds and the winner notified.

Help in keying in: In case some of the reverse characters are had to read here they are in non-reverse:

15	**INTRODUCTION**
20	**SET UP VARIABLES**
90	**INPUT WORD**
190	**GUESS WORD**
500	**WRONG LETTER**
1000	**CORRECT LETTER**
4020	**PRESS ANY KEY TO PLAY AGAIN**
5000	**INTRODUCTION**
6000	**RULES**
6040	*HANGMAN*
6060	THIS GAME IS KNOWN WORLD WIDE
6070	AND ALMOST EVERYONE KNOWS THE RULES
6080	PLAYER ONE INPUTS A WORD AND
6090	PLAYER TWO TRIES TO GUESS IT
6110	THE COMPUTER PLACES A DASH IN THE PLACE OF THE LETTERS AND DRAWS THE GALLOWS AS WELL AS AN ANIMATED HANGING
6120	PLAYER TWO YOU GUESS BY
6130	PRESSING THE REQUIRED LETTER FOR YOUR CHOICE. THE COMPUTER WILL PLACE A CORRECT LETTER IN ITS PLACE OR DRAW MORE OF THE GALLOWS IF IT IS INCORRECT
6140	PRESS ANY KEY TO PLAY
6160	L

PROGRAMS

Program notes:
A$=word of guess
C$=letters of word guessed
Q$=Incorrect letters chosen
Z$=Latest letter choice
WRONG: No. of wrong guesses.

Solo game

This program can be easily adapted so that the computer and not a friend chooses a word by the following changes:

18 GOSUB 7000
7000 DIM R$ (A,B)
(Where A is the number of words you want and B the maximum length. Then lines 7010 onwards as: LET R$(1)=CAT; LET R$(2)DOG, etc, etc.

Now follow this with a "return" statement. Enter:
60 LET A$-R$ ((INT(RND*A) + 1))
70 GOTO 170

The more words you put in the string, R$, the less often the computer will choose the same word.

The reverse character in the graphics for the title is S.


```
TO TYPE IN THE GRAPHICS FOR THE
LARGE "HANGMAN" WORD IN THE
INTRODUCTION FOLLOW THE BELOW.
TYPE.- 5100 PRINT TAB 1,"
THEN USE THE BELOW CHART.
KEY.- " " =SPACE
      S =GRAPHIC SPACE
ALL OTHERS STAND FOR THE GRAPHIC
CHARACTERS ON THE KEYS
```

E.G.

```
  10 REM
  11 REM   ** HANGMAN **
  12 REM
  13 REM
  14 REM
  15 REM   **INTRODUCTION**
  16 SLOW
  17 GOSUB 5000
  18 REM
  20 REM **SET UP VARAIBLES**
  25 LET CP=0
  30 LET WRONG=0
  40 LET S=0
  50 DIM Q$(26)
  60 REM (IF YOU WISH TO HAVE
         THE COMPUTER CHOOSE
         A WORD THEN REFER
         TO NOTES)
  80 CLS
  90 REM     **INPUT WORD**
 100 PRINT AT 2,9;"PLAYER ONE";T
AB 9;"INPUT WORD"
 110 INPUT A$
 120 IF A$="" THEN GOTO 110
 130 FOR N=1 TO LEN A$
 135 IF CODE A$(N)=0 THEN GOTO 1
50
 140 IF CODE A$(N)<38 OR CODE A$
(N)>63 THEN GOTO 110
 150 NEXT N
 160 DIM B$(LEN A$)
 166 FOR F=1 TO LEN A$
 167 IF A$(F)=" " THEN LET B$(F)
=" "
 168 NEXT F
 170 DIM C$(LEN A$)
 190 REM     **GUESS WORD**
 200 PRINT AT 2,16,"TWO",TAB 9;"
GUESS"
 210 FOR N=1 TO LEN A$
 220 PRINT AT 6,N+2;"-"
 225 IF A$(N)=" " THEN PRINT AT
6,N+2;" "
 230 NEXT N
 232 GOTO 695
 235 IF INKEY$<>"" THEN GOTO 235
 236 LET Z$=INKEY$
 237 LET A=0
 238 LET CP=CP+1
 239 PRINT AT 4,9;"▀▀▀▀▀▀▀▀▀▀▀▀▀▀";A
T 4,9;"▀▀▀▀▀▀▀▀▀▀▀▀▀▀" AND INT (CP/2
)=CP/2
 240 IF Z$="" THEN GOTO 236
 245 IF CODE Z$<38 OR CODE Z$>63
 THEN GOTO 235
 250 FOR N=1 TO LEN A$
 260 IF Z$=A$(N) AND Z$<>B$(N) T
HEN GOTO 1000
 265 NEXT N
 266 IF A>0 THEN GOTO 235
 270 IF Z$<>Q$(CODE Z$-37) THEN
GOTO 500
 280 FOR F=1 TO 10
 285 PRINT AT 20,CODE Z$-36;Z$
 290 PRINT AT 20,CODE Z$-36;CHR$
(CODE Z$+128)
 300 NEXT F
 500 REM     **WRONG LETTER**
 505 LET Q$(CODE Z$-37)=Z$
 510 IF WRONG=12 THEN GOTO 2000
 520 PRINT AT 20,CODE Z$-36;Z$
 530 LET WRONG=WRONG+1
 540 IF WRONG=1 THEN GOTO 550
 545 GOTO WRONG*20+555
 550 FOR F=1 TO 11
 560 PRINT AT F+7,10;"█"
 570 NEXT F
 575 FOR F=1 TO 40
 576 NEXT F
 580 GOTO 235
 600 PRINT AT 18,8;"▀▀▀▀▀"
 610 GOTO 575
 620 PRINT AT 16,9;"▞",TAB 8,"▞"
;TAB 7;"▞"
 630 GOTO 575
 640 PRINT AT 16,11;"▚ ";TAB 12;
"▚ ",TAB 13;"▚"
```

```
 650 GOTO 575
 660 PRINT AT 7,10;"█▀▀▀▀▀▀▀▀▀▀▀█"
 670 GOTO 575
 680 RRINT AT 7,13;"█";TAB 12;"▞
";TAB 11;"▞"
 690 GOTO 575
 695 PRINT AT 11,15;"█████";TA
B 16;"▙▄▄▄▟",TAB 17;" ██ ",TAB 17
;" ██ ";TAB 17;" ██ ";TAB 17;" ██ "
;TAB 17;" ██ ";TAB 16;"▛▜ ▛▜"
 696 IF WRONG<1 THEN GOTO 575
 700 PRINT AT 8,18;"O"
 710 GOTO 575
 720 PRINT AT 9,18;"█"
 730 GOTO 575
 740 PRINT AT 9.17,"/"
 750 GOTO 575
 760 PRINT AT 9,19;">"
 770 GOTO 575
 780 PRINT AT 10,17;"▞"
 790 GOTO 575
 800 RRINT AT 10,19;"▚"
 810 GOTO 575
1000 REM **CORRECT LETTER**
1010 PRINT AT 6,N+2;Z$
1020 LET Q$(CODE Z$-37)=Z$
1030 LET B$(N)=Z$
1032 IF A$=B$ THEN GOTO 3000
1035 LET A=A+1
1040 NEXT N
1041 FOR F=1 TO 40
1042 NEXT F
1050 GOTO 235
2000 PRINT AT 14,15;"█████";TA
B 15,"▙▄▄▄▟",TAB 17;" ██ ";TAB 17
;" ██ ",TAB 16,"▛▜ ▛▜"
2010 PRINT AT 7,15,"▒",TAB 16,"▒
";TAB 17;" ▒ ";TAB 17," O ";TAB
15;" /█> ";TAB 15;" ▌▐ "
2020 PRINT TAB 15;"          "
2030 PRINT AT 2,16,"ONE";TAB 9;"
  WON     ";TAB 9;" HANGMAN  "
2500 LET S=1
3000 FOR F=1 TO LEN A$
3010 LET C$(F)=CHR$ (CODE A$+128
)
3020 NEXT F
3030 FOR F=1 TO 20
3040 PRINT AT 5,3;C$
3045 PRINT AT 6,3;A$
3050 NEXT F
3060 IF S=1 THEN GOTO 4000
3070 PRINT AT 3,9;"   WON
";TAB 9;" HANGMAN  "
4000 FOR F=1 TO 50
4010 NEXT F
4020 PRINT AT 21,0;"**PRESS ANY
KEY TO PLAY AGAIN**"
4030 IF INKEY$="" THEN GOTO 4020
4040 CLS
4050 GOTO 20
5000 REM **INTRODUCTION**
5005 DIM M$(3,3)
5010 LET M$(1)=" O "
5020 LET M$(2)="/█>"
5030 LET M$(3)="▞ ▚"
5040 FOR F=1 TO 3
5050 FOR N=1 TO 30 STEP 3
5060 PRINT AT F,N;M$(F)
5070 NEXT N
5080 NEXT F
5090 PRINT
5100 PRINT TAB 1;"HANGMAN HANG
MAN"
5110 FOR F=1 TO 3
5120 FOR N=28 TO 1 STEP -3
5130 PRINT AT F+10,N;M$(F)
5140 NEXT N
5150 NEXT F
5160 PRINT
5180 PRINT "  PRESS ""P"" TO PLA
Y OR ""I"" FOR            INSTRU
CTIONS"
5190 FOR F=1 TO 3
5200 FOR N=1 TO 30 STER 3
5210 PRINT AT F+17,N;M$(F)
5220 NEXT N
5230 NEXT F
5250 LET A$=INKEY$
5260 IF A$="" THEN GOTO 5250
5270 IF A$="I" THEN GOTO 6000
5280 IF A$<>"P" THEN GOTO 5250
5300 IF INKEY$="" THEN GOTO 5300
5310 CLS
5320 RETURN
6000 REM ** RULES **
6002 FAST
6005 CLS
6010 FOR F=0 TO 21
6020 PRINT "████████████████████████████
███████████"
6030 NEXT F
6035 SLOW
6040 PRINT AT 1,10;"**********";T
AB 10;"*HANGMAN*";TAB 10;"*******
***"
6050 PRINT
6060 PRINT " THIS GAME IS KNOWN
WORLD WIDE"
6070 PRINT " AND ALMOST EVERYONE
KNOWS THE    RULES."
6080 PRINT " PLAYER ONE INPUTS A
[illegible]"
6090 PRINT " PLAYER TWO TRIES TO
GUESS IT."
6100 PRINT
6110 PRINT " THE COMPUTER PLACES
[illegible] THE PLACE OF THE LE
TTERS AND    DRAWS THE GALLOWS
[illegible] HANG
[illegible]"
6120 PRINT " *** PLAYER TWO [illegible]
GUESS BY"
6130 PRINT " PRESSING THE REQUIR
ED LETTER    FOR YOUR CHOICE.THE
COMPUTER     WILL PLACE A CORRE
 LETTER      IN ITS PLACE OR [illegible]
 MORE OF [illegible]
[illegible]"
6140 PRINT "     PRESS ANY KEY TO
PLAY "
6150 IF INKEY$<>"" THEN RETURN
6160 RRINT AT 21,27;"L"
6170 IF INKEY$<>"" THEN RETURN
6180 PRINT AT 21,27;"L"
6190 GOTO 6150
9970 CLEAR
9980 CLS
9990 SAVE "HANGMAN"
9999 RUN
```

ZX81

Business helper

Jason Bradley, of Waipu, supplies this program which may help small businesses with revenue statements.

The program asks for certain data and then arranges it in to the form of a revenue statement showing gross profit, trading profit, and net profit. The program runs on a 16K.

A very good effort by Jason, says our Sinclair editor.

```
   1 REM "REVENUE"
  10 PRINT " INPUT NAME OF BUSIN
ESS."
  20 INPUT B$
  30 PRINT " INPUT DATE(DD/MM/YY
)"
  40 INPUT D$
  50 PRINT " INPUT NON-OPERATING
 INCOME"
  60 INPUT O
  67 CLS
  68 PRINT " INPUT SUNDRY OPERAT
ING INCOME"
  69 INPUT SUN
  70 CLS
  71 PRINT " INPUT NET SALES
 COMMISSION"
  80 INPUT SALES
  90 PRINT " INPUT COST OF SALES
"
 100 PRINT " IF COMMISSION ENTER
0"
 110 INPUT CSALES
 120 CLS
 130 PRINT "IS THIS INFORMATION
CORRECT Y/N"
 140 PRINT "NAME: ",B$
 150 PRINT "DATE: ";D$
 160 PRINT "SALES: ";SALES
 170 PRINT "COST OF SALES: ";CSA
LES
 171 PRINT "SUNDRY OPERATING INC
OME   ",SUN
 180 IF INKEY$="N" THEN RUN
 190 IF INKEY$="Y" THEN GOTO 20
 195 GOTO 180
 200 CLS
 210 PRINT "HOW MANY EXPENSES DO
 YOU HAVE?"
 220 INPUT EXPENSET
 230 DIM E$(EXPENSET,12)
 240 DIM C$(EXPENSET,10)
 241 FOR N=1 TO EXPENSET
 242 PRINT " INPUT NAME OF EXPEN
SE";N,"(MAX 12 LETTERS)"
 250 INPUT E$(N)
 260 PRINT E$(N)
 270 FOR X=1 TO 50
 280 NEXT X
 290 CLS
 300 NEXT N
 310 FOR N=1 TO EXPENSET
 320 PRINT " INPUT COST OF ";E$(
N)
 330 INPUT C$(N)
 340 PRINT E$(N);"=$";C$(N)
 350 FOR X=1 TO 50
 360 NEXT X
 370 CLS
 380 NEXT N
 390 PRINT "IS THIS INFORMATION
CORRECT Y/N?"
 391 FOR N=1 TO EXPENSET
 392 PRINT E$(N);"=$",C$(N)
 400 NEXT N
 420 IF INKEY$="N" THEN GOTO 210
 430 IF INKEY$="Y" THEN GOTO 450
 440 GOTO 420
 450 GOTO 6000
5999 STOP
6000 CLS
6001 PRINT "REVENUE STATEMENT FO
R ";AT 1,0;B$;"AS AT  ",D$
6020 PRINT "SALES ";("COMMISSION
" AND CSALES=0);TAB 23;"$";SALE
S
6024 PRINT "COST OF SALES";TAB 2
3;"$";CSALES
6025 PRINT "GROSS PROFIT";TAB 23
,"$",SALES-CSALES
6026 PRINT "+SUNDRY INCOME";TAB
23,"$",SUN
6027 PRINT TAB 23,"-------"
6028 PRINT "TOTAL PROFIT";TAB 23
,"$",(SALES-CSALES)+SUN
6030 FOR N=1 TO EXPENSET
6040 PRINT E$(N),TAB 22,C$(N)
6050 NEXT N
6061 DIM T(EXPENSET)
6065 LET T(1)=VAL C$(1)
6080 FOR V=2 TO EXPENSET
6090 LET T(V)=T(V-1)+VAL C$(V)
6100 NEXT V
6101 PRINT "-TOTAL EXPENSES",TAB
 23,"$",T(EXPENSET)
6110 LET TOTAL=(SALES-CSALES)-T(
EXPENSET)
6120 PRINT
6130 PRINT "+NON-OPERATING INCOM
E",TAB 23,"$",O
6140 PRINT
6150 PRINT "NET PROFIT";TAB 23,"
$",TOTAL+O+SUN
7999 STOP
```

VIC 20

This program by M. Vickers, of Howick, will be useful for those VIC-20 owners who make use of user-defined graphics facility. The author writes:

"The program will run on the unexpanded machine and remedies the laborious task of planning characters, and then converting it to decimal, using pen and paper.

"The program accepts binary strings and converts them to their decimal equivalent. An enlarged version of the character is displayed in red and white blocks on the left of the screen. Below this the binary and decimal is shown.

"Three options are then open to the user:

1. He may wish to invert the character and the computer will display the inverted character and the appropriate decimal values, i.e. 255-original number.
2. The computer will poke the data into the locations 7168 to 7175 and display the final character in its normal size.
3. The program will re-run and the character previously held in location 0 will be deleted.

Program notes:

1-150: Set variables, accept 8 binary inputs, breaks string down, checks if '1' is in string and adds appropriate value.

160-320: POKE large scale version of character to screen in red and white blocks. Prints binary and its decimal equivalent. Prints options available to user and jumps to appropriate routine.

1000-1090: POKE inverted character and its decimal values.

2000-2060: Routine for determining which elements of string contain a '1' or '0'. If '1' a red block will be poked to the screen else a white block will be poked to screen.

2990-3050: Routine for POKEing data to locations 7168 to 7175 and displays the final character in its normal size.

3060: Holds data for string slicing in lines 70-150.


```
1 REM CHARACTER GENERATOR
2 REM M.VICKERS 1984
3 A=1:T=1
4 DIM T%(8),A$(8)
10 POKE36879,8
20 PRINT"(clr home)"
25PRINT"(cntrl white)"
30 PRINT"CHARACTER GENERATOR"
50PRINT"          12345678"
60 INPUT"    BIN.";A$(A)
70 READ X
80 IF MID$(A$(A),X,1)="1" THEN READ B:T%(T)=T%(T)+B
90 IF MID$(A$(A),X,1)<>"1"THEN READ C
95 IF X<8 THEN X=X+1:GOTO70
150 IF T<8 THEN T=T+1:A=A+1:RESTORE:GOTO60
160 PRINT"(clr home)":FOR Y=1TO8:PRINTA$(Y):NEXT
170 PRINT:PRINT"BINARY      DECIMAL"
180 FOR Y=1TO8:PRINTA$(Y);"     ";T%(Y):NEXT
185 GOSUB2000
190PRINT"1: INVERT CHARACTER":PRINT"2: SEE CHARACTER":PRINT"3:
    CREATE NEW CHARACTER"
200 INPUT" 1,2,3 ";C$
210 IFC$="1"THENPRINT"(clr home)":GOSUB1000:GOTO320
220 IFC$="2"THENPRINT"(clr home)":GOSUB2990
230 IFC$="3"THENCLR:GOTO3
320 IFC$<>"1"ORC$<>"2"ORC$<>"3"THENGOTO160
1000 SP=0
1001 FOR T=1TO8:PRINTA$(T):NEXT
1010 FOR Y=7702+SP TO 7856+SP STEP22:IF PEEK(Y)=48THENPOKEY,160:
     POKEY+30720,2
1020 IFPEEK(Y)=49THENPOKEY,160:POKEY+30720,1
1030 IFPEEK(Y)=32THENPOKEY,160:POKEY+30720,2
1032 NEXT
1035 IF SP<7THENSP=SP+1:GOTO1010
1040 PRINT:PRINT"DECIMAL"
1050FORT=1TO8
1060PRINT"  ";255-T%(T):NEXT
1070 PRINT"RETURN TO MENU ?"
1080 GETW$:IFW$="Y"THENRETURN
1090 GOTO1080
2000 SP=0
2010 FORY=7702+SP TO 7856+SP STEP22
2020 IFPEEK(Y)=48THENPOKEY,160:POKEY+30720,1
2030 IFPEEK(Y)=49THENPOKEY,160:POKEY+30720,2
2040 IFPEEK(Y)=32THENPOKEY,160:POKEY+30720,1
2050 NEXT:IF SP<7THENSP=SP+1:GOTO2010
2060 RETURN
2990 PRINT"(home)PLEASE WAIT"
3000 POKE52,28:POKE56,28:FORI=7168to7679:POKEI,PEEK(I+25600):NEXT
3001 POKE36869,255
3005 FORT=1TO8
3020POKE7167+T,T%(T):NEXT:PRINT"(home)IT LOOKS LIKE THIS":PRINT:
    PRINT" @ @ @ @ @ @ @ @ "
3030PRINT:PRINT:PRINT"RETURN TO MENU ?"
3040GETW$:IFW$="Y"THENPOKE36869,240:RETURN
3050goto3040
```

Commodore 64

Astro-Field

This game by Daniel Moore uses multi-colour sprites and sound. About 95 per cent is in machine language. Use joystick port 2. The player moves left and right, dodging asteroids. This is available on cassette from Daniel (see instructions for Daredevil, printed in this issue).

ASTRO-FIELD

```
0 REM *** ASTRO-FIELD ***
1 REM *** BY DANIEL MOORE ***
2 REM *** FOR COMMODORE 64 ***
9 PRINT"PLEASE WAIT DATA BEING READ IN"
10 FORN=49152TO49404:READH:POKEN,A:T=T+H
20 NEXT
30 IF T<>26395THENPRINT"DATA ERROR TRY CHECKING IT":END
40 PRINTCHR$(147)POKE54279,0 TI$="000000":SYS49377
50 PRINTCHR$(147):PRINTCHR$(147):PRINT"YOUR TIME WAS ";TI$:POKE54296,0
60 PRINT"FIRE TO START AGAIN"
70 J=PEEK(56320)AND16
80 IFJ=16THEN70
90 GOTO40
500 DATA25,149,153,21,85,85,23,213,245,5,213,208,1,85,80,0,85,64
510 DATA0,85,64,0,21,0,0,29,0,0,29,0,0,29,0,0,29,0,0
520 DATA29,0,0,29,0,0,4,0,0,4,0,0,4,0,0,4,0,0,0
521 DATA0,0,0,0,0,0,0,0,0,160,0,185,0,192,153,64,3,192,64,240,4,200
522 DATA76,67,192,169,1,141,21,208,169,1,141,23,208,169,13,141,248,7
530 DATA169,1,141,28,208,169,56,141,0,208,169,56,141,1,208,76,156,192,201,83
540 DATA208,249,173,0,220,201,123,208,3,206,0,208,201,119,208,3,238,0,208
550 DATA173,0,208,201,255,208,3,206,0,208,201,32,208,3,238,0,208,238,39
560 DATA208,96,162,0,172,4,220,169,32,32,210,255,232,136,224,6,240,7,192
570 DATA0,208,241,76,187,192,32,118,192,162,0,76,166,192,169,42,32,210,255
580 DATA173,31,208,201,1,240,3,76,156,192,169,0,141,21,208,162,0,160,7
590 DATA140,33,208,200,192,7,208,248,232,224,0,208,241,96,169,24,141,24,212
600 DATA 169,81,141,23,212,169,255,141,6,212,169,129,141,4,212,169,11,141,1
610 DATA212,76,65,192
```

Commodore 64

Chopper strike

In the March program special, a program called Chopper Strike was printed. Many readers had difficulty reading the reversed characters.

Smart Cable

Smart Cable, a universal RS232 cable that connects peripherals with serial ports, such as printers and modems, to your computer, is available from Solstat Industries (P.O. Box 13-183, Christchurch).

Smart Cable (price $275) is for those who are constantly changing systems and peripherals and don't want to spend hours trying to hook an alien printer or modem to the system.

The maker claims Smart Cable works for more than 95 per cent of all possible RS232 connections.

A report in *InfoWorld* (February 13, 1984) said its "set-up and ease of use couldn't be simpler."

```
10 REM *** CHOPPER STRIKE ***
20 REM *** BY D.MOORE ***
30 POKE53280,0:POKE53281,5:PRINTCHR$(149)
40 PRINTCHR$(147);"           *** CHOPPER STRIKE ***":PRINTCHR$(17);CHR$(17)
50 PRINT"       POSITION SIGNT  ON HELICOPTER";:PRINTCHR$(17);CHR$(17);CHR$(17)
60 PRINT"       AND FIRE.USE JOYSTICK PORT #2"
70 PRINTCHR$(17);CHR$(17);" SPEED (1-3)BEGINNERS"
80 PRINTCHR$(17);CHR$(17);" SPEED (4-8)INTERMEDIATE"
90 PRINTCHR$(17);CHR$(17);" SPEED (9-11)EXPERT"
100 PRINTCHR$(17);CHR$(17);"INPUT" SPEED ";SP:SP=SP+10
101 IFSP<10ORSP>21THENPRINTCHR$(145);CHR$(145);CHR$(145);CHR$(145);:GOTO100
110 PRINTCHR$(17);CHR$(17);:INPUT" SHOTS ";SH
111 IFSH<1THENPRINTCHR$(145);CHR$(145);CHR$(145);CHR$(145):GOTO110
120 CO=0:N1=0:VP=100:HP=100
130 FORN=1TO10:READS1(N):READS2(N):NEXT
140 :
150 :
200 REM *** SET UP SPRITES ***
210 PRINTCHR$(147):V=53248:POKEV+21,3:POKE2040,13:POKE2041,14:POKEV+40,5:POKE532
81,6
220 FORN=0TO62:READD:POKE832+N,D:NEXT
230 FORN=0TO27:READD:POKE896+N,D:NEXT
240 FORN=1TO35:POKE923+N,0:NEXT
250 POKEV+23,2:POKEV+29,2:POKEV+0,100:POKEV+1,100:PRINTCHR$(154)
300 REM *** GET SPRITE POSITIONS ***
310 VE=INT(RND(1)*(240-48)+48)
320 FORHO=23TO255STEPSP:POKEV+2,HO:POKEV+3,VE
330 :
340 :
400 REM *** JOYSTICK ROUTINE ***
410 JV=PEEK(56320):FR=JVAND16:JV=15-(JVAND15):POKEV+30,0
430 IF FR<>16THEN600
440 IFJV=1THENVP=VP-SP
450 IFJV=2THENVP=VP+SP
460 IFJV=4THENHP=HP-SP
470 IFJV=5THENVP=VP-SP:HP=HP-SP
480 IFJV=6THENVP=VP+SP:HP=HP-SP
490 IFJV=8THENHP=HP+SP
500 IFJV=9THENVP=VP-SP:HP=HP+SP
510 IFJV=10THENVP=VP+SP:HP=HP+SP
520 IFHO>235THENCO=CO+1:GOSUB540:GOSUB560:GOTO310
530 GOSUB560:POKEV+0,HP:POKEV+1,VP:NEXT:GOTO440
540 PRINTCHR$(147);CHR$(18);"SCORE";CHR$(146);N1;CHR$(18);"SHOTS";CHR$(146);CO
541 IFCO=SHTHEN900
550 RETURN
560 IFHP<24THENHP=HP+SP
570 IFHP>254THENHP=HP-SP
580 IFVP<48THENVP=VP+SP
590 IFVP>240THENVP=VP-SP
595 RETURN
600 REM *** ANTI-AIRCRAFT GUNS ***
610 FOR1=0TO24:POKE54272+1,0 NEXT:CT=0
620 POKE54278,5
630 POKE54277,5:CT=CT+1
640 POKE54276,129
650 POKE54295,241
660 POKE54293,54:POKE54294,28
670 IFS1(CT)<>0THEN750
700 POKE54273,S1(CT):POKE54272,S2(CT)
710 POKE54296,79
720 POKE54276,128
730 GOTO630
740 IFCT+1<6THENFORT=1TO100*CT:NEXT
750 POKE54296,0
760 :
770
900 REM ** CHECK FOR HIT ***
910 IF PEEK(V+30)AND1=1THENH1=HI+1:CO=CO+1:GOTO830
920 CO=CO+1:GOSUB540:NEXT
930 FORN=1TO4:FORJ=1TO20:POKEV+40,J:NEXT:NEXT:POKEV+40,5
940 GOSUB540
950 GOTO310
960 :
970 :
980 REM ** END OF GAME ***
990 PRINT"YOU GOT ";HI;" OUT OF ";SH
920 PRINT"%";(HI/SH)*100
930 PRINT"PRESS FIRE TO RESET "
940 JV=PEEK(56320):FR=JVAND16
950 IFFR<>16THENPOKEV+21,0:CLR:RESTORE:GOTO10
960 GOTO940
1000 REM *** DATA ***
1010 REM *** SOUND ***
1020 DATA17,37,19,63,21,154,22,227,25,177,28,214,32,94,34,175,34,255,-1,-1
1030 REM *** SIGHT ***
1040 DATA255,255,255,136,24,17,144,24,9,160,24,5
1050 DATA192,24,3,128,24,1,128,24,1,128,24,1,128,24,1
1060 DATA255,255,255,255,255,255,128,24,1,128,24,1,128,24,1,128
1070 DATA64,1,129,24,1,192,24,3,160,24,5,144,24,9,136,24,17,255,255,255
1080 REM *** HELICOPTER ***
1090 DATA0,255,254,3,0,1,0,112,3,192,32,7,160,48,15,144
1100 DATA1,255,252,0,63,192,0,18,64,0,63,240,0
```

TRS80/System 80

Pdriver 48K

By B.N. Briggs

Users of Electric Pencil v2 frustrated at not being able to output control codes to their printer (and who haven't got a working copy of Pencil Plus) might find this patch useful. It permits control and graphic codes to be passed to the printer, allowing your letters and manuscripts to be "prettied" up.

It requires no patches to "Electric Pencil" itself (it patches into the printer DCB at 4026H) and may be loaded using the PLOAD command of Pencil. While it allows control and graphic codes to be passed to the printer, you must remember that when a code is entered, it is the patch that is controlling the printer not Pencil, this means that considerable problems could arise when justifying lines, indeed the program's use should be restricted to headings and graphics etc.

PDRIVER also contains its own printer driver (to permit ALL codes to go to the printer). When PDRIVER is loaded Pencil uses this driver and will work on both the TRS-80 and System 80 without any further modification.

There are six commands that can be used:

(1) = '<nnn'

When 'nnn' equals the required code, either a printer code or a graphic character.

(2) ='<a'

Where 'a' equals any character other than numeric or the following control codes. This is perhaps the most useful of the 6, it outputs 2 codes, the first is the escape code (27) followed by the ASCII value of 'a', eg '<@' will send 27 and 64 to the printer, '<-<001' will send 27, 45 and 1, the code for underline on the Star Gemini and most other Epson compatible printers.

(3) = '<&nnnxxx'

Where 'nnn' equals the code to be printed and 'xxx' equals the number of times to print it. eg '<&065080' will print 'A' 80 times. Useful for printing a line of graphic blocks across the page. (The same as the BASIC 'STRING$' function).

(4) = '</'

Will disable PDRIVER allowing the '<' to be used normally. When '<' & '/' is entered, PDRIVER is deactivated until condition (5) is encountered.

(5) = '<?'

Will enable PDRIVER again, allowing control codes to be passed once more to the Printer.

(6) = '<(nnn'

This is a USER CALL, in the listing shown. The call is to a RET, (to prevent any harm should the command be

entered) however, by replacing 'BLANK' with the address of your own routine, you can call that address, (REG 'A' will contain the decimal value entered) eg. a M/L routine to print dot addressable graphics. The original of this program does just that. The decimal value entered points to one of a number of blocks of data that can be output to the printer.

Some points to remember. In (1), (3) and (6), 'nnn' and 'xxx' must be three digits, e.g. '1' must be entered as '001', and be between 0-255. If by mistake, numeric and other characters are mixed, e.g. '<2h9', the patch will accept this but the results may not be what you want. A string of code must be entered with no spaces or page wrap-around (a space or carriage return could be mistaken for a code), e.g. '<-<001' not '< -<001'. While the patch as listed will operate with Pencil, it could also work with other word processors that use the printer vector at 4026H and 4027H. However, you will have to check the manual to be sure and perhaps change the method of protecting the top of memory (Pencil used with DOS uses the HIMEN address at 4049H and 404AH).

```
                00010 ;
                00020 ;
                00030 ;* PORTVER *
                00040 ;B. N. Briggs
                00050 ;14 Allan Berry Avenue
                00060 ;Napier
                00070 ;
                00080 ;This Program will allow Codes to
                00090 ;be passed to a Printer by ELECTRIC
                00100 ;PENCIL
                00110 ;
                00120 ;
4026            00130           ORG     4026H   ;Patch into
                00140 ;                         ;Printer
4026 00FF       00150           DEFW    BEGIN   ;Vector
                00160 ;
                00170 ;
4049            00180           ORG     4049H   ;Set DOS Mem,
                00190 ;                         ;PENCIL
4049 FEFE       00200           DEFW    BEGIN-2 ;uses this
                00210 ;                         ;Vector
                00220 ;
                00230 ;
FF00            00240           ORG     0FF00H
                00250 ;
                00260 ;Change these Codes to ones that are
                00270 ;not used by your Printer
                00280 ;
003C            00290 CTRL      EQU     '<'     ;Control Char
                00300 ;
003F            00310 QM        EQU     '?'     ;turns
                00320 ;                         ;PORTVER on
                00330 ;
002F            00340 SL        EQU     '/'     ;turns it off
                00350 ;
0028            00360 USR       EQU     '('     ;Calls a M/L
                00370 ;                         ;Routine
                00380 ;
0026            00390 APS       EQU     '&'     ;Code to out-
                00400 ;                         ;put a string
                00410 ;
001B            00420 PCTRL     EQU     27      ;Printer
                00430 ;                         ;Control char
                00440 ;
FF00 21F1FF     00450 BEGIN     LD      HL,FLAG ;Flag decides
                00460 ;                         ;where to go
FF03 7E         00470           LD      A,(HL)  ;Check value
FF04 B7         00480           OR      A
FF05 2009       00490           JR      NZ,PRTORV ;Not Zero
                00500 ;                         ;then CTRL
FF07 79         00510           LD      A,C     ;has been.
FF08 FE3C       00520           CP      CTRL    ;Control Char
FF0A C293FF     00530           JP      NZ,OUT  ;no, so PRINT
FF0D 3601       00540           LD      (HL),1  ;Yes,set Flag
FF0F C9         00550           RET             ;and back
FF10 21F0FF     00560 PRTORV    LD      HL,DEC  ;DEC=No of
                00570 ;                         ;chars in
                00580 ;                         ;'<nnn'
FF13 FE05       00590           CP      5       ;5=turned off
FF15 3048       00600           JR      NC,OFFON ;& want QM
FF17 FE04       00610           CP      4       ;4=Call to M/L
FF19 286C       00620           JR      Z,USRCAL;Routine
FF1B FE03       00630           CP      3       ;3=Waiting
FF1D CA01FF     00640           JP      Z,STRNG3 ;for xxx of
                00650 ;                         ;<&nnnxxx
FF20 FE02       00660           CP      2       ;2='nnn' of
FF22 CABEFF     00670           JP      Z,STRNG2 ;'<&nnnxxx'
FF25 79         00680           LD      A,C     ;None so far
FF26 FE28       00690           CP      USR     ;so compare
FF28 2004       00700           JR      NZ,CHKOFF ;Chars
FF2A 3E04       00710           LD      A,4
FF2C 1812       00720           JR      SLASH
FF2E FE3F       00730 CHKOFF    CP      QM      ;QM turn
FF30 2822       00740           JR      Z,FIN2  ;PORTVER On
FF32 FE2F       00750           CP      SL      ;SL then OFF
FF34 2004       00760           JR      NZ,STRING;No? then
                00770 ;                         ;what else?
FF36 3E05       00780           LD      A,5     ;Set Flag
FF38 1806       00790           JR      SLASH   ;for OFF
FF3A FE26       00800 STRING    CP      APS     ;If APS then
FF3C 2006       00810           JR      NZ,NOTSTR ;a String
```

```
FF3E 3E02   00820         LD      A,2     ;so set Flag
FF40 32F7FF 00830 SLASH   LD      (FLAG),A ;& back to
FF43 C9     00840         RET             ;PENCIL
FF44 FE30   00850 NOTSTR  CP      '0'     ;None of the
FF46 3837   00860         JR      C,LETTER ;above, see
FF48 FE3A   00870         CP      '9'+1   ;if it's No.
FF4A 3033   00880         JR      NC,LETTER ;or Letter
FF4C CDADFF 00890         CAll    CONVER  ;No. so Con-
FF4F 35     00900         DEC     (HL)    ;vert & dec-
FF50 C0     00910         RET     NZ      ;crease DEC
            00920 ;
            00930 ;FINISH sends a Byte to the Printer
            00940 ;and resets Flags
            00950 ;
FF51 CD93FF 00960 FINISH  CAll    OUT     ;Send Code to
FF54 3603   00970 FIN2    LD      (HL),3  ;Printer &
FF56 AF     00980         XOR     A       ;Reset Flags
FF57 32EEFF 00990         LD      (STORE),A ;ready for
FF5A 32EFFF 01000         LD      (STORE2),A ;another
FF5D 32F1FF 01010         LD      (FLAG),A ;Code etc.
FF60 C9     01020         RET
            01030 ;
            01040 ;OFFON is used when 'CTRL' & 'S'
            01050 ;has been sent to turn PORIVER off
            01060 ;& we're waiting for 'CTRL' & 'Q'
            01070 ;to turn it on
            01080 ;
FF61 FE06   01090 OFFON   CP      6       ;We're OFF &
            01100 ;                       ;want ON to
            01110 ;                       ;turn me ON
            01120 ;                       ;6= Ctrl has
            01130 ;                       ;been entered
FF63 79     01140         LD      A,C     ;Check char.
FF64 2808   01150         JR      Z,QUCST
FF66 FE3C   01160         CP      CTRL    ;Is it CTRL
FF68 2029   01170         JR      NZ,OUT  ;NO, Back to
            01180 ;                       ;Driver '
FF6A 3E06   01190         LD      A,6     ;YES, change
FF6C 1802   01200         JR      STASH   ;S to 6
FF6E FC3F   01210 QUEST   CP      ON      ;Check if ON
            01220 ;                       ;follows CTRL
FF70 28E2   01230         JR      Z,FIN2  ;Reset all
            01240 ;                       ;flags if so
FF72 3E3C   01250         LD      A,CTRL  ;No so output
            01260 ;                       ;CTRL & the
FF74 C093FF 01270         CALL    OUT     ;Char that
FF77 79     01280         LD      A,C     ;followed it.
FF78 CD93FF 01290         CALL    OUT
FF7B 3C05   01300         LD      A,5     ;& reset the
FF7D 18CI   01310         JR      SLASH   ;6 to 5
            01320 ;
            01330 ;LETTER sends 'PCTRL' and the Byte
            01340 ;that followed to the Printer
            01350 ;
FF7F 3E1B   01360 LCTTER  LD      A,PCTRL ;If here then
FF81 CD93FF 01370         CALL    OUT     ;a letter was
            01380 ;                       ;entered so
FF84 79     01390         LD      A,C     ;send PCTRL
            01400 ;                       ;plus what
            01410 ;                       ;came after
FF85 18CA   01420         JR      FINISH  ;it
            01430 ;
            01440 ;USRCAL enables you to call a seperate
            01450 ;M/t routine and pass the value in
            01460 ;Reg 'A' to that routine
            01470 ;NOTE-The call is blanked off at the
            01480 ;moment, it has been left in just to
            01490 ;show what can be done.
            01500 ;
FF87 CDA0FF 01510 USRCAL  CALL    CONVER  ;The usual
FF8A 35     01520         DEC     (HL)    ;stuff
FF8B C0     01530         RET     NZ
FF8C E5     01540         PUSH    HL      ;All done
FF8D CDACFF 01550         CALL    BLANK   ;so call
FF90 E1     01560         POP     HL      ;your
FF91 18C1   01570         JR      FIN2    ;routine
            01580 ;
            01590 ;OUT sends any Code to the PRINTER
            01600 ;(the ROM driver won't accept a '0')
            01610 ;
FF93 47     01620 OUT     LD      B,A     ;Save char
FF94 3A4038 01630 OUT1    LD      A,(3840H) ;Check if
            01640 ;                       ;BREAK down
FF97 CB57   01650         BIT     2,A     ;and return
FF99 CD     01660         RET     NZ      ;if so
FF9A CD0105 01670         CALL    5D1H    ;Printer OK?
FF9D 20F5   01680         JR      NZ,OUT1 ;if not then
            01690 ;                       ;keep waiting
FF9F 3AD705 01700         LD      A,(5D1H) ;If Zero
FFA2 B7     01710         OR      A       ;then System
            01720 ;                       ;80
FFA3 78     01730         LD      A,B     ;Char to be
FFA4 2003   01740         JR      NZ,TRS  ;Printed in A
FFA6 03F0   01750         OUT     (0F0H),A ;System 80
FFA8 C9     01760         RET
FFA9 32EB37 01770 TRS     LD      (37EBH),A ;or TRS 80
FFAC C9     01780 BLANK   RET
            01790 ;
            01800 ;CONVERT changes 3 decimal # to HEX
            01810 ;
FFA0 3AEEFF 01820 CONVER  LD      A,(STORE) ;Get any
FFB0 47     01830         LD      B,A     ;previons #.
FFB1 8D     01840         ADD     A,B     ;x 2
FFB2 B7     01850         ADD     A,A     ;x 4
FFB3 80     01860         ADD     A,B     ;x 5
FFB4 B7     01870         ADD     A,A     ;x 10
FFB5 47     01880         LD      B,A     ;& strip 48
FFB6 79     01890         LD      A,C     ;off the new
FFB7 D630   01900         SUB     30H     ;# just
FFB9 B0     01910         ADD     A,B     ;entered &
FFBA 32EEFF 01920         LD      (STORE),A ;add it in
FFBD C9     01930         RET             ;& save it
            01940 ;
            01950 ;STRN$2 is used when (&nnnxxx is
```

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```
                01960 ;entered & we want 'nnn' part of
                01970 ;(&nnnxxx
                01980 ;
FFBE CDADFF     01990 STRN62  CALL    CONVER  ;Get the Hex
FFC1 35         02000         DEC     (HL)    ;
FFC2 C0         02010         RET     NZ      ;& save the
FFC3 32EFFF     02020         LD      (STORE2),A ;Value
FFC6 3E03       02030         LD      A,3     ;and reset
FFC8 77         02040         LD      (HL),A  ;SOME flags
FFC9 32F1FF     02050         LD      (FLAG1),A
FFCC AF         02060         XOR     A
FFCD 32EEFF     02070         LD      (STORE),A ;& back to
FFD0 C9         02080         RET             ;PENCIL
                02090 ;
                02100 ;STRN63 gets 2nd part of (&nnnxxx
                02110 ;
FFD1 CDA0FF     02120 STRN63  CALL    CONVER  ;Got the 1st
FFD4 35         02130         DEC     (HL)    ;so we want
FFD5 C0         02140         RET     NZ      ;the 2nd
FFD6 B7         02150         OR      A       ;Got it, is
FFD7 CA54FF     02160         JP      Z,FIN2  ;Zero? Do
                02170 ;                       ;nothing
FFDA 3D         02180         DEC     A       ;else check
FFDB 47         02190         LD      B,A     ;if a '1'
FFDC 3AEFFF     02200         LD      A,(STORE2);Yes then
FFDF CA51FF     02210         JP      Z,FINISH ;do it once
FFE2 F5         02220 LOOP    PUSH    AF      ;Else send
FFE3 C5         02230         PUSH    BC      ;'nnn'
FFE4 CD93FF     02240         CALL    OUT     ;'xxx' times
FFE7 C1         02250         POP     BC
FFE8 F1         02260         POP     AF
FFE9 10F7       02270         DJNZ    LOOP
FFEB C351FF     02280         JP      FINISH
FFEE 00         02290 STORE   DEFB    0       ;Various
FFEF 00         02300 STORE2  DEFB    0       ;Buffers etc
FFF0 03         02310 DEC     DEFB    3       ;used by
FFF1 00         02320 FLAG    DEFB    0       ;the Program
FFF2 00         02330         DEFB    0
FF00            02340         END     BEGIN   ;END & START
00000 TOTAL ERRORS
30092  1EXT AREA BYTES LEFT


APS     0026 00390   00800
BEGIN   FF00 00450   00150 00200 02340
BLANK   FFAC 01780   01550
CHKOFF  FF2E 00730   00700
CONVER  FFAD 01820   00890 01510 01990 02120
CTRL    003C 00290   00520 01160 01250
DEC     FFF0 02310   00560
FIN2    FF54 00970   00740 01230 01570 02160
FINISH  FF51 00960   01420 02210 02280
FLAG    FFF1 02320   00450 00830 01010 02050
LETTER  FF7F 01360   00860 00880
LOOP    FFE2 02220   02270
NOTSTR  FF44 00850   00810
OFFON   FF61 01090   00600
OUT     FF93 01620   00530 00980 01170 01270 01290 01370 02240
OUTI    FF94 01630   01680
PCTRL   001B 00420   01360
PRTDRV  FF10 00560   00490
QN      003F 00310   00730 01210
QUEST   FF6E 01210   01150
SL      002F 00340   00750
SLASH   FF40 00830   00720 00790 01200 01310
STORE   FFEE 02290   00990 01820 01920 02070
STORE2  FFEF 02300   01000 02020 02200
STRING  FF3A 00800   00760
STRN62  FFBE 01990   00670
STRN63  FFD1 02120   00640
TRS     FFA9 01770   01740
USR     0028 00360   00690
USRCAL  FF87 01510   00620
```

Pocket BBC

Acorn has been floating the idea of its pocket-sized, LCD screened, hand-held BBC variant, code-named the Neutrino. With just black and white graphics but the standard BBC BASIC the product looks set to roll with a solid initial software base, unlike the QL.

Text processor

IBM has introduced text processing programs for IBM Personal Computers: the DisplayWrite Series and PCWriter. The PC DisplayWrite Series includes text processing programs similar to those available for the widely used IBM DisplayWriter.

Commodore 64

Daredevil

In this game by Daniel Moore, aged 14, the space bar is used to jump. Multi-coloured sprites, sound and machine language are used. The game gets slowly harder. For those who haven't time to key the game in send a blank cassette and $7 or just $10 (no disks, please) to Daniel Moore, C/- Bits & Bytes, Box 827, Christchurch.

```
DAREDEVIL

0 X=255
10 REM       *** DAREDEVIL ***
20 REM *** BY T.HENDERSON AND D.MOORE ***
30 PRINTCHR$(147):INPUT "DO YOU WANT INSTRUCTIONS [Y/N]";A$
40 IFA$<>"Y"THEN110
50 PRINTCHR$(147);"          **** DAREDEVIL **** "
60 PRINT" ↑ USE THE SPACE BAR TO JUMP ONCOMING CARS"
70 PRINTCHR$(17);CHR$(17);"     THE GAME SLOWLY GETS HARDER"
80 PRINTCHR$(17);CHR$(17);"            AS CARS SPEED UP"
90 PRINTCHR$(17);CHR$(17);"        YOU ONLY HAVE ONE LIFE"
100 PRINTCHR$(17);CHR$(17)"       TIME DISPAYED WHEN GAME OVER"
110 PRINTCHR$(17);CHR$(17);"         HIT ANY KEY TO START"
120 GETA$:IFA$=""THEN120
130 PRINTCHR$(147)
140 FORN=832TO1022:POKEN,0:NEXT
150 REM *** SETUP SPRITE MAM ***
160 FORN=832TO894:READA:POKEN,A:NEXT
170 DATA1,80,0,5,112,0,5,224,0
180 DATA5,240,0,5,192,0,7,240,0
190 DATA0,192,0,21,80,0,85,80,0
200 DATA81,117,64,81,85,112,49,112,60
210 DATA241,80,0,2,160,0,2,160,0
220 DATA10,40,0,8,8,0,40,10,0
230 DATA32,2,0,60,3,192,63,3,240
240 FORN=896TO958:READA:POKEN,A:NEXT
250 DATA1,80,0,5,112,0,5,224,0
260 DATA5,240,0,5,192,0,7,240,0
270 DATA0,192,0,1,80,0,1,80,0
280 DATA1,112,0,1,80,0,1,112,0
290 DATA3,208,0,2,224,0,2,160,0
300 DATA2,128,0,2,128,0,2,128,0
310 DATA2,128,0,3,192,0,3,240,0
320 FORN=960TO980:READA:POKEN,A:NEXT
330 DATA0,0,85,0,40,4,5,169,84
340 DATA21,85,84,127,87,244,119,87,116
350 DATA127,3,240
360 V=53248:POKEV+21,0:POKE2040,13:POKE2041,14:POKE2042,15
370 POKEV,100:POKEV+1,200:POKEV+2,100:POKEV+3,200:POKEV+4,200:POKEV+5,200
380 POKEV+37,2:POKEV+38,15:POKEV+39,14:POKEV+40,14
390 POKEV+23,4:POKEV+29,4:POKEV+28,7
400 FORN=49152TO49152+140:READA
410 POKEN,A:NEXT
420 DATA48,25,174,0,192,172,0,192,136,192,0,208,251,202,224,0,208,243
430 DATA96,174,30,208,224,5,208,1,96,162,6,142,21,208,32,2,192,206,4
440 DATA208,162,5,142,21,208,32,2,192,206,4,208,165,203,201,64,208,3
450 DATA76,140,192,32,112,192,206,4,208,32,2,192,206,3,208,174,30,208,224
460 DATA6,208,1,96,172,3,208,192,99,208,232,206,4,208,32,2,192,238
470 DATA3,208,174,30,208,228,6,208,1,96,172,3,208,192,200,208,232,76
480 DATA19,192,169,6,141,21,208,206,1,192,201,0,208,1,96,174,0,192,206
490 DATA0,192,228,46,240,1,96,238,0,192,96,0
500 FORN=49292TO49292+69:READA:POKEN,A:NEXT
510 DATA173,207,192,201,0
520 DATA208,31,169,1,141,207,192,169,15,141,24,212
530 DATA169,32,141,18,212,169,55,141,1,212,141,0,212,169,0,141
540 DATA24,212,76,19,192,169,15,141,24,212,169,32,141
550 DATA18,212,169,255,141,1,212,141,0,212,169,0,141,24,212
560 DATA141,207,192,76,19,192,0,0,0
570 GOTO500
580 TI$="000000":POKEV+30,0:SYS49152+19
590 POKEV+21,0:PRINT"YOUR TIME IS ";TI$:GOTO620
600 INPUT "JUMPING HEIGHT (1-150) ";JU
610 JU=200-JU:POKE49234,JU:PRINTCHR$(147):GOTO580
620 FORN=1TO1000:NEXT:PRINT"HIT ANY KEY TO START AGAIN"
630 GETA$:IFA$=""THEN630
640 RESTORE:GOTO9
```

Commodore rules bottom of U.S. market

By Steven Darnold

Last year Commodore had 38 per cent of the American market in computers selling for under $US1000. This put it in first place by a large margin. In second place was Texas Instruments, with 21 per cent. Then came Timex (the American manufacturer of the Sinclair range) with 20 per cent, and Atari with 10 per cent.

Most of the activity in the under-$1000 category was at the bottom end of the range. The top four firms each had computers selling for under $100 and this is where most of the turnover occurred. This year, however, there have been a lot of changes. Texas Instruments and Timex have pulled out of the market entirely, and Atari has discontinued the 400. This leaves the VIC-20 as the only major computer selling for under $US100.

The VIC's monopoly of the under-$100 range is nicely complemented by the Commodore 64's popularity among the more expensive computers. Atari is having to work just to keep its share, and newcomers, such as Coleco and Spectravideo, are struggling to make an impact. Most of the 21 per cent Texas Instruments share and Timex's 20 per cent share is likely to go to Commodore, leaving it with about two-thirds of the American market (under $US1000).

The picture is not quite so rosy for Commodore in Britain. Although the 64 is performing very well, the VIC-20 is fading fast. In Britain, the VIC has plenty of competition. Several British computers are selling for about the same price, with more memory, better graphics and fancier BASICs. The VIC-20 just can't keep up. On the other hand, the 64 is very popular in Britain. It lies in second place, behind the cheaper Spectrum, and well ahead of the BBC.

In New Zealand, Commodore appears to be firmly in the number 1 position. Last Christmas the VIC-20 was the biggest selling home computer, but sales have declined sharply since then. Now the Commodore 64 is in first place, and it looks like holding that position for a considerable time to come.

IEEE interfaces

Last November, in *Bits & Bytes* I discussed using IEEE peripherals and examined the three IEEE interfaces available in New Zealand. I concluded that there were substantial advantages in using such interfaces, but that there were compatibility problems with some software.

Since writing that article, I have spent many months using the DAMS interface with an IEEE disk drive, and I am very happy with its performance. It loads programs three times faster than a 1541 and there's no flickering of the red light. It is definitely good value for money.

As the months went by, however, I began to amass a collection of disks which clashed with the interface. Zork II and Zork III didn't work, although Zork I did. Starcross didn't work. The DTL compiler didn't work, even though the manual said it could be used with IEEE drives. Blue Max didn't work. It was frustrating. The disks sat on the shelf gathering dust because I couldn't load them.

Two months ago, I solved all my problems by getting a better IEEE interface. I ordered a Buscard II direct from America. It cost me $350, but it is worth every penny. Unlike the three interfaces I reviewed in November, it does not clash with software; it works with 100 per cent of the programs I have tried. In addition it includes the BASIC 4.0 disk commands, a machine-language monitor (with assembler and disassembler), and a Centronics printer port. On the top of the Buscard cartridge are lots of little switches to select various configurations of serial and parallel peripherals, including one which automatically sends true ASCII out the Centronics port. On the side of the Buscard is an extension of the cartridge port so that other cartridges can be plugged in.

In total the Buscard II is a superb product. It enhances the 64's hardware capabilities by giving it ready access to the wide selection of parallel printers and to the faster/higher capacity IEEE drives. These capabilities are well integrated into the 64 and are totally transparent to the user. In addition, the BASIC 4.0 disk commands and monitor plug the two most serious gaps in the 64's firmware.

I hope the Buscard II will someday be available in New Zealand. However, if you can't wait, A B Computers in America gives good service and accepts VISA.

DTL Compiler

This compiler is available in three versions: tape, 1541 disk, and IEEE disk. Each version uses the same manual and dongle (security key); the only difference between them is the tape or disk. Each version sells for $150 in New Zealand.

The tape version is not recommended. It can compile only short programs, up to 12.5K, and it lacks several of the options available on the disk versions. This severely limits the utility of the compiler. In addition, the tape compiler is dangerous. It requires the dongle to be pushed on to the cassette port while the power is on -- this can blow a chip in the computer! Users are advised to avoid this version of the compiler. Dealers with a tape version in stock should consider turning it into a disk version by copying the programs from a disk version. The dongle works fine with either version.

The 1541 version is much better than the tape version. It can handle any size of program, and it allows you to attach the dongle before the computer is turned on. The only serious limitation with this version is that it has only an 8.5K buffer for storing DATA statements, and it stops compiling when the buffer is full. So far I have had two Adventure games fail to compile because they had too many DATA items.

The IEEE version comes on the same disk with the 1541 version. It does everything the 1541 version does, plus it estimates the problem with DATA statements. Instead of storing DATA statements in a RAM buffer, it stores them on the disk. This requires an extra disk channel so it doesn't work with the 2031 single drive, which has no more channels than a 1541. However, it might work with the single Super Drive from Viscount Electronics.

I have compiled about a dozen programs so far and I'm reasonably happy with the results. The DTL compiler isn't fussy; it happily accepts an ordinary BASIC program, even one with machine-language subroutines. No special modifications or editing are required, although such modifications can be made if desired to speed up execution.

One benefit of using the compiler is speed. Although the DTL promotional

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literature claims that compiled programs run up to 25 times faster, most programs in fact run only about twice as fast. This is not a huge increase, but it is a useful improvement. Moreover, compiled programs are not subject to "garbage collection" delays. In uncompiled programs which do a lot of string handling, such delays can last five seconds or longer. The compiler plays a very useful role in eliminating these delays.

A second benefit of using the compiler is accuracy. As a program is processed, the compiler checks all the lines and reports any errors. This is an excellent way for ensuring that a program is free from hidden bugs. For example, when I compiled one of my Adventures, I discovered a GOTO to a non-existent line. At least 20 people had previously played that Adventure and not one had hit that mistake. Thanks to the compiler, that mistake has now been eliminated.

A third benefit of the compiler is security. A compiled program is impossible to list and is much harder to decipher than machine language. If you want to hide your listing from curious eyes, the compiler will do the job nicely. Also, if you have some method of protecting your program from copying, the compiler will make it more difficult for pirates to figure out what you've done.

Games

In the March *Bits & Bytes*, I had a look at Beach-Head and noted that some copies had a line of flickering garbage in the middle of the screen. Alpine Computing now informs me that all copies now being sold are free from this flickering. Moreover, Alpine has kindly offered to re-record the earlier copies free of charge. So, if you have a flickering version of Beach-Head, send the original tape to Alpine and it will fix it.

Last month I remarked that an important part of Hexpert's instructions was missing on the cassette card. Alpine has now corrected this, and all current copies of Hexpert have the full instructions.

This month I will take a look at five new games released by Alpine. Four of them are from Anirog, and one of them is from Romik. They all come on cassette tape, and they all cost $24.95.

Galaxy

Until this month I had played four Anirog games, and three had serious problems. I was beginning to wonder if Anirog knew what it was doing. Now, however, Anirog is back in my good books. Galaxy is its best game yet.

Galaxy is a good copy of the popular arcade game, Galaga. Little beasties swirl around the screen in intricate formations, and your job is to blast them to smithereens. Occasionally a mother ship will capture one of your fighters in a traction beam. Then, if you shoot the mother ship at the right moment, the captured fighter is released to join your other fighter, and you can blast away with both of them.

The graphics and sound in Galaxy are good, but not spectacular. Movement is very smooth and the controls are responsive. There is, however, a noticeable limitation to the rate of fire: only two shots can appear on the screen at one time.

A lot of thought has gone into the design of Galaxy, and it is by far the most polished Anirog game I have seen. For example, players have the choice of using a joystick or the keyboard, and there are alternate keys for left-handed and right-handed players. Even in a two-player game, each person gets to choose his own controls. Such attention to detail makes the game a real pleasure.

The Galaxy tape uses a Turbo routine to load the program as fast as a 1541 disk drive. This is similar to the routines in the Arrow and Rabbit cartridges, except it is built into the program and requires no special hardware. Commodore 64 users who do not have disk drives will welcome the high speed of the Turbo loader. Keep in mind, however, that the faster the tape loads, the more susceptible it is to errors. To work reliably with the Turbo, cassette heads must be in correct alignment and they must be kept clean.

Skramble

Although not quite as good as Galaxy, Skramble is another worth-while game from Anirog. As in the arcade game, you pilot your ship through six stages: rockets, cavern, fireballs, city, maze, and base. If you succeed in destroying the enemy base, you are taken back to the first stage for another run, but this time there are more obstacles and you consume fuel at a faster rate.

Dedicated games players will probably find the first run of Skramble too easy. There is a generous allocation of fuel and there is plenty of time to avoid most of the obstacles. Good players will have to advance to the second or third runs to find a real challenge. Beginners, however, will appreciate the relative ease of the first run. It gives them a real opportunity to figure out what's going on and what strategies to adopt.

The graphics in Skramble are quite good, but the sound is disappointing. Muffled explosions and monotonous throbs simply don't do justice to the game. When you push the fire button, a bomb is dropped and a rocket is fired, but no sound whatsoever is produced. It's almost as if the game were being played underwater.

Like Galaxy, Skramble uses the Turbo loader. Thus, instead of taking 10 minutes for its 32K to load, the program is ready to run in about one minute.

The Dungeons

So far, every Anirog program I've seen has been a copy of an arcade game. This one, however, is something different. It is a computerised version of a Dungeon & Dragons adventure.

The beginning is fairly standard. On the basis of your attributes, you choose whether to be a magician or a fighter. Then, after buying suitable weapons and equipment, you enter the dungeons. Each dungeon is represented on the screen by a 3-D perspective of three walls. Exits are shown by door-shaped holes in the walls. Against this background, sprites are used to display the monsters and objects present in the dungeon.

The graphics are simple, but they work well. Unfortunately, the rest of the game doesn't. The main problem is that the game is tediously simple-minded. You wander from dungeon to dungeon, killing monsters and picking up treasure. There are only a few types of monsters, so you meet the same ones over and over. Most of them die at a single blow, and after a while it's no fun killing them.

Occasionally the tedium is broken by sudden death. Without warning you can starve to death, or suffocate, or fall into a pit. Or a monster which never hurt you before may suddenly find hidden stores of viciousness and kill you. This is frustrating and infuriating. For example, on numerous occasions I died of starvation without warning when I had plenty of food in my pack.

Frustrations also arise from the mechanics of the game. Single-key commands are used and mis-understandings often occur. For example sometimes E means EAT and sometimes it means EAST. As a result, it is easy to accidently consume your scarce food supplies. In addition there is a serious problem when you hit D for DROP: you are forced to choose something to drop, and dropped items always disappear. On several occasions I accidently hit D and had to decide which item to sacrifice.

The Dungeons seems to have been rushed to market without adequate testing. The input structure is poorly designed and needs to be much more user-friendly. Moreover, the game itself is short of good ideas and really needs further development.

Dark Dungeons

The Dungeons was bad enough all by itself, but in fact it is the first instalment of a four-part series. Oh, dear. Dark Dungeons is the second part.

I must give credit where credit is due: Dark Dungeons does correct the problem with DROP. It is now possible to exist without being forced to drop something. Otherwise, however, Dark Dungeons is no better than The Dungeons.

Dark Dungeons is very similar to its predecessor. There are a few new monsters and a few new treasures, but otherwise the surroundings are pretty much the same. One innovation is that the dungeons are dark until you find a source of light; another is that you have to bid for supplies instead of just buying them. And of course there are some new ways of suddenly dropping dead. You can play Dark Dungeons without having first played The Dungeons. In fact, if you

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Debugging and error messages

By Tony Graham

Commodore computers when encountering a program error they recognise, display a short error message to indicate the nature of the error. For example:

SYNTAX ERROR IN 50

Knowing the type of error is one thing, actually finding it is another. Some errors are easily found, and for those that are not, using a logical system of debugging will save much frustration. The SYNTAX error is probably the most common, this message being displayed when the computer does not understand a command.

If GOSUB is entered as GOSOB, or PRINT entered as PPRINT, or if any other key word is mis-spelt a SYNTAX error will result. These are the most obvious errors and easily corrected.

Harder to spot are missing parentheses (brackets) in complex operations. Any operation must have the same number of lefthand parentheses as righthand parentheses.

The most subtle SYNTAX error occurs with the READ statement. The following short program will crash with SYNTAX ERROR IN 10.

```
10 READ D
20 PRINT D
30 DATA HELLO
```

The variable D is a numeric variable and the computer is expecting to receive a number; the DATA statement contains string data. The program will run if in lines 10 and 20 D is changed to D$.

Let us assume you have a program which comes up with SYNTAX ERROR IN 140. LISTing 140 displays a line with multiple statements and no obvious error. With Commodore's editing features it is easy to insert a STOP: immediately after a colon, but before where you suspect the error may be. Again RUN the program. If the STOP: is before the error the program will STOP with BREAK IN LINE 140. If, on the other hand, the SYNTAX error is reached before the STOP, the SYNTAX error will again be displayed. By moving the STOP to different positions on the line the offending statement can be located, making correction of the error much easier. Note that 5 bytes is required to insert a STOP: be sure to re-enter any characters pushed off the end of the line while editing.

The OUT OF DATA ERROR occurs when a READ statement is encountered and there is no DATA left to READ. If the READ is in a FOR – NEXT loop it is possible to ask the computer to print the value of the variable used in the loop, as soon as the OUT OF DATA message is displayed.

```
70 FOR X=1 TO 50:READ A
80 POKE Y+X,A:NEXT X
```

In the above example X is the variable used in the loop. If PRINT X is entered via the keyboard immediately the program crashes. The number of DATA statements read, less 1, will be displayed. That is, if X=50, 49 DATA elements will have been read. The OUT OF DATA ERROR occurs when an attempt is made to READ the fiftieth, there, is therefore, 1 DATA element missing. A common error is to use something like – FOR X=0 TO 50. This attempts to READ 51 elements of DATA, not 50 as many may suppose.

An alternative to find the number of DATA elements missing is to add a line of dummy DATA to the end of the existing DATA, i.e. 50000 DATA 1,2,3,4,5,6,7,8,9.

Now edit the line that READs the DATA, to PRINT it, i.e. READ A:PRINT A. The number of dummy DATA elements read will reveal the number of elements missing.

OUT OF DATA errors may also occur when due to other program errors DATA is not RESTORED before an attempt is made to READ for a second time.

THE OUT OF MEMORY error: unless a programmer has some knowledge of how BASIC is stored it is difficult to explain how to avoid this problem. There is the possibility that the program is too large and nothing can be done, although it is much more likely for the programmer to be having difficulty with a program which should fit the machine.

One common cause of this error is failing to end a GOSUB routine with a RETURN, and then using a GOTO, which results in the re-use of the GOSUB.

Try this two-line program which ends with an OUT OF MEMORY error.

```
10 GOSUB 20
20 GOTO 10
```

After RUNning these two-lines try PRINT FRE(0). You will find the free memory only about 20 bytes less than when you first turned on your computer. So why the OUT OF MEMORY error?

The answer is your computer has no free memory in an area known as the STACK. This is a temporary storage area the computer uses to hold the address to which it must RETURN after a GOSUB. If too many addresses are STACKed by GOSUBs without any RETURNs, the STACK becomes overloaded, the OUT OF MEMORY error being displayed. Only 24 GOSUBs are permitted, without any corresponding RETURNs as this two-line program will show.

```
10 X=X+1:GOSUB 20
20 PRINT X:GOTO 10
```

Another possible cause for the OUT OF MEMORY error is that a previously run program altered the pointers that keep track of BASIC's operation. These pointers are not reset with NEW but are reset with SYS64802 on the VIC. It is wise to exit from any program that manipulates these pointers with SYS64802 so as to leave the computer clear for further use, without the need to first switch off. An incorrect POKE into the pointer memory locations may also cause an OUT OF MEMORY error.

Avoiding wastage of memory by efficient programming is about the only other way of preventing the OUT OF MEMORY error, but that is a subject in itself.

Picture tops

By Peter Archer

The VIC, with its unique video interface chip (from which the VIC takes its name), is capable of producing a very high quality picture on most televisions and monitors.

It is, therefore, a pity that some VIC owners are not achieving this potential high quality.

A common complaint often voiced by owners of earlier model VICs goes like this: "My picture has an interference type pattern which is worse when I play cartridge games". The cause of this complaint can almost always be traced to the modulator rather than the computer itself.

Early model VICs (those sold in N.Z. until about the end of 1982) had modulators which were not as good as those supplied more recently, although the more recent ones still do not approach the extremely high quality of the modulators fitted to the Commodore-64s. However, any VIC modulator can perform well if it is correctly tuned and well shielded.

Older-style VIC modulators can be recognised by their colour (matt black) and by the one small Phillips screw holding the two halves of the case together. Newer ones have a black-brown stippled finish and a small "made in Japan" label on one end.

If you carefully remove the screw (on the newer type the largest of the three screws on one end only), you will see a silver coloured box containing the actual modulator.

Older type modulator

One of the reasons for poor picture performance is poor earthing of the outer case. This can be improved by scraping the paint from around the screw to allow the screw to touch bare metal. Commodore (NZ) recommends to all its dealers that this be done by the dealers before sale, but some dealers may not have bothered.

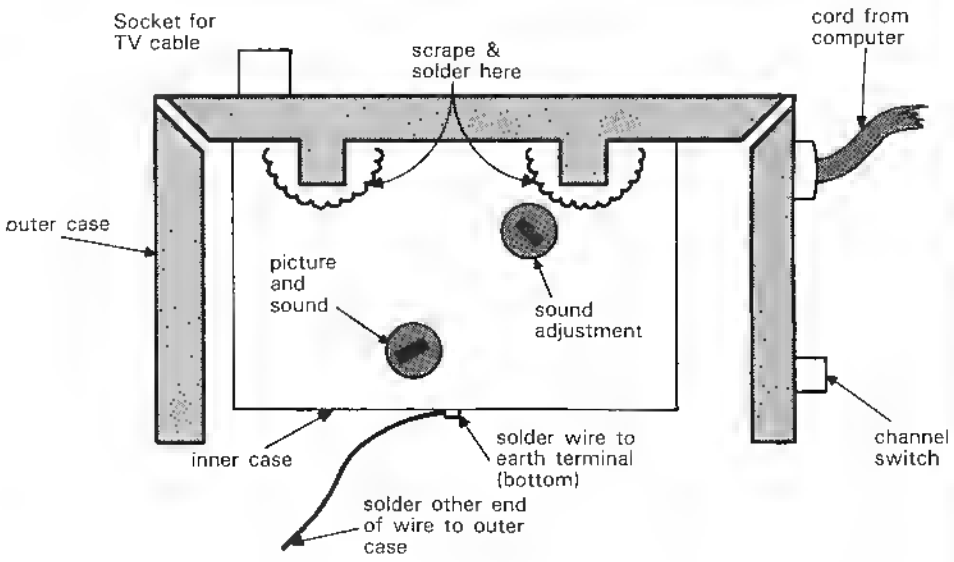
In some cases it may be necessary to go even further and solidly connect the two halves of the case together. To do this requires some skill with a soldering iron, so if you do not have this skill ask a friend who has the skill or take your modulator back to your dealer and show him this magazine article.

If you have the necessary tools and skill, cut a piece of multi-strand wire to about 4in long, and strip about half an inch from each end. Solder one end to one of the earth lugs on the inner (silver) case. To solder the other end to the inside of the detached part of the outer case, you will have to scrape some paint from a suitable spot on the inside of the case. Carefully work out the position that the wire will take prior to scraping the paint off. (There is not a lot of spare room). Tin both the wire and the case with solder and then solder the wire to the case. You will need a soldering iron of about 25 watts (no smaller and not too much larger.)

It may also be advisable to solder the inner case to the part of the outer case which stays attached to the inner case. To do this, refer to Fig. 1, and scrape the black paint off the outer case lugs and the chrome plating off the inner case from around the lugs. Tin both these areas and then solder them together. A fair amount of heat is required, but not an excessive amount.

I can confirm that the above does have a considerable effect, because some time ago a VIC owner for whom I had done this complained of a sudden deterioration in picture quality which had been perfect. On opening the case, I found that the solder connecting the outer and inner cases had somehow parted company. A one minute re-solder job restored the picture to its previous top quality.

FIG. 1 – Older type VIC modulator



Modulator tuning

Some VIC modulators may be mistuned, or have drifted out of tune. Retuning should not really be attempted by anyone unless they know what they are doing, so if in doubt find a technically qualified friend or ask your Commodore dealer.

Older-type modulators have two tuning slugs visible though holes in the inner case (see Fig. 1), one affects picture and sound and the other sound only. To tune these requires a suitable small non-magnetic alignment tool. Never attempt to use a screwdriver. Other stop-gap tools pressed into service can be risky. I have seen more than one broken tuning slug resulting from the efforts of over-ambitious VIC owners.

If you have the necessary tool and expertise tune the picture first followed by the sound. I usually fit a cartridge game such as "Avengers" or "Star Battle" and have someone play the game while I tune both picture and sound. A program which provides a black screen background provides a more stringent test than the normal VIC power-up colours.

Newer modulators

The newer VIC modulators can be treated similarly to the older ones, with the following exceptions:

- There are two screws holding the inner and outer cases together. These are located on the outside adjacent to the TV aerial lead socket. You can remove these and scrape the paint off from around them.
- The tuning slugs are hidden inside the inner case with no holes to allow access to them. Most modulators seem to have the earth wire from the aerial lead soldered on to the edge of the lid; this would have to be unsoldered. Also the inner case has to be unscrewed from the outer to remove this lid.

Further tips

Try placing your modulator on top of the power supply case, especially the older style black metal type power supplies. This often improves picture quality as the magnetic field from the transformer seems to provide a shielding effect for the modulator.

Alternatively, rest the modulator on a metal plate. Or place it inside a metal box. Or even wrap it up in aluminium foil. All of these tricks have been known to work for some VIC owners.

Another trick is to form the lead between the modulator and the TV into a loop and wrap a length of aluminium foil around the doubled up cable. Now change the size and position of the loop for optimum picture quality.

If none of the above cure your problems, you should refer back to your Commodore dealer. There are several internal adjustments of picture signal strength and colour level inside the VIC case which can sometimes dramatically improve your picture. But these should only be done by a qualified person. Besides, if your computer is still under warranty, fiddling about inside the case may void the warranty.

Vic fans!

This month we have started a regular VIC column – after numerous requests from VIC-20 users.

We hope you will support the column by reading it and sending any contributions or queries to our column co-ordinator, Peter Archer, P.O. Box 860, Nelson.

Gold, maze, and mine

By Paul Graham

I have just received a copy of the game, Gold Rush, by Craig Saunders. This game runs on an unexpanded VIC and is in 100 per cent machine code.

The object of the game: you are on a remote island in the South Pacific. You must go around a maze in a cave and collect gold left by pirates. The gold is in a pile at the top of the screen. You must carry your gold around the maze and place it in a cargo hatch, but an alien is in the maze and he shoots on sight.

Your only protection from the alien is to turn invisible until he has gone. Unfortunately your invisibility is short lived, so only use it when you need to. There is also a mine creeping towards your cargo hatch, which is at the bottom of the screen. The mine must be constantly pushed back to your starting position before it blows up your cargo. Sometimes you find gold coins at the position the mine starts from; try to collect them before pushing back the mine.

The maze you are in uses cleverly designed graphics, giving a 3-D effect. There are eight speeds at which the game can be played, from just bearable through to impossible. The game also has programmable screen and border colour with 16 possible combinations.

In general, Gold Rush is a good game considering the limited memory it requires. The game was written in New Zealand and compares well with imported software. Gold Rush is distributed by Viscount Electronics Ltd, P.O. Box 513, Palmerston North.

Price not supplied. — Editor.

Repeaterrr beefs up word processing

By John MacGibbon

As I use my Apple mainly for word processing, I have long felt a need for auto repeat on the keyboard. I had considered doing a keyboard mod I'd read about in a magazine, but, not being much of a hardware hacker, I decided not to risk it.

Eventually I sent away for a device called the ''Repeaterrr'', which I saw advertised in the American Softalk magazine. I'm more than satisfied with the results.

The Repeaterrr, which costs $US25, contains a couple of chips and a few other components, on a six centimetre long printed circuit board. It can be installed on any Revision 7 or above Apple which has a separate encoder board under the keyboard. I don't know whether it can be used on the IIe.

First step in installing it is to remove the keyboard encoder board. This is a fairly simple operation, made easier by a special tool supplied with the kit. The encoder board has 25 pins which connect it to the keyboard. The Repeaterrr has 25 holes that match and slide over these pins. Then a jumper wire is clipped on to a resistor on the encoder board, which is then clipped back under the keyboard.

The unit is pre-set to make all keys automatically repeat after they've been held down for 0.6 seconds. However, a variable resistor with a large knurled knob allows this to be easily adjusted between 0.3 and 1.3 seconds.

Adjusting the delay to zero turns the Repeaterrr off. The manual suggests this may be necessary for some keyboard controlled games. However, in practice we haven't needed to. The control can be easily reached with the cover of the computer off, but of course this is a hassle if you have a monitor sitting on top.

Being able to turn the repeat function on and off from the keyboard would be better, and I have since seen an American advertisement for a different unit that allows this.

One good feature of the Repeaterrr is that it uses the keyboard repeat key to double the repeat rate. In this mode the double-rate repeat begins immediately, rather than after the present delay. We've found this to be particularly useful for word processing, as it greatly speeds up cursor movement. It would also be useful for users of spreadsheets like Visicalc or Multiplan.

This auto repeat works for all keys, including those for cursor movement. Using it in conjunction with the control key enables very fast scrolling, deletion and other editing functions.

For an additional $10 an optional shift key modification is supplied with the unit. This gives a shift-key to game I/O connection while supplying a plug-in connector to keep the game I/O open for the paddle plug. I did not need this as I already had a shift key modification.

Our humble Apple has now become quite a supercharged wordprocessor. First a lower case chip let us see writing as it was meant to be writ, then we bought a Vision 80 card to see the full page width, and now with the Repeaterrr we can zip around the screen at a great rate. What beats me, though, is why Apple Computer Inc didn't include these things in the first place. Apart from lower case, it doesn't even put them on the newer IIe.

The Repeaterrr is available from High Order Micro Electronics Corporation, 17 River Street, Chagrin Falls, Ohio OH 44022, USA. The price is $US24.95, or $US34.95 with the optional shift key modification.

Exciting challenges in Econet

By Pip Forer

The 6502 second processor is finally here. In spite of the temptation to rush out comments on it, however, I will take time to savour its capabilities and report next month. This month we will discuss Econet generally and review some user-group software from Britain.

As most readers will know, Econet is a proprietary Local Area Network (LAN) for the BBC microcomputer. Any BBC can have an Econet capability through the insertion of an Econet ROM and some associated hardware. This then allows the machine to plug in to an Econet LAN. The LAN itself comprises other BBC machines (or other Acorn marques) connected by twisted-pair wiring and with a system clock to give everyone a common timing signal. Data and files can be transferred through the wire at a maximum speed of 400,000 bits per second (or 5000 bytes per second). This is slow by certain mainframe standards and expensive office LANs but outpaces most micro networks and certainly those utilising the RS-232 protocol.

Econet has three distinct purposes. One is to allow several users to share expensive peripherals. A group of machines can share a printer and disk drives (of course, there is no reason why individual machines on the network can't have their own peripherals, too). A second purpose is co-ordination and common access. By sharing the same physical resource common files or programs can be downloaded and a group of users can integrate their activities. A final purpose is interaction between users. Independent of any files or peripherals different users can communicate with each other. Although these three aspects often get confused they are in fact quite separate functions of a network. The first is simple economics but the latter two functions expand the general capabilities and potential ways of using the computer.

The network often has at least three sorts of stations on it. Apart from standard user stations there is a disk file server and a printer server. In fact, there may be more than one of each of these. What is often overlooked is just how much more a network is than just links to a printer or disks.

The Econet software, for instance, consists of at least four components. One or all of these can be active or present at any time. One is the network filing system. There are two levels to this and in Econet III the options include directory hierarchies and various network access controls such as passwords. People tend to see the file server as the heart and reason for the network, which rather overstates its importance. A second is the printer-server software, which in Econet is ROM based and sits very satisfactorily as a background task in any machine running it. The third set of commands are routines to pass messages, screen contents or control between one station and another. It is possible, for instance, to look at other users' screens or take over another user's machine by usurping the keyboard. However, these are in fact just routines which use a final and extremely flexible level of the software. These are the network primitives.

Network primitives allow the user to define blocks of memory to move

between machines. They let you set control blocks and transmit or receive blocks within various machines. Any machine can have one or more blocks and each block can have its own port number that identifies it. A standard operating system call to OSWORD is used to activate a particular block. For instance to send 200bytes of RAM contents between two machines means that the receiving machine must have a receiver control block set up and space allocated for the incoming values (the receive block). The transmitting station must have a transmit control block set up defining the memory area for transmission (the transmit block). The operating system call then simply actions the transmission from one machine to another.

The most apparent use of this is to view someone-else's screen (where you move their video memory into your machine). But the possibilities are endless, particularly when one discovers, for example, that other primitives allow the user to enter a machine-code routine set up in another machine. Even with the simplest form of block moves the options are considerable. One machine, for instance, could be running some sort of simulation and storing current status into a particular block of memory. Any other users on the system with the right software could receive that memory block on request to see how the simulation progressed. Alternatively, several users could be running their own simulations and might store their current status in a transmit block which, every so often, could be checked by a single 'overlord' machine which could compare everybody's progress.

A class experimenting with a sampling program might be one such example, where sample means from the class's various samplings could be collated and compared. The capabilities basically allow you to run a set of BBCs as a set of inter-related tasks in a way that alternative options, such as using common disk files, can not match for speed or flexibility. The simplest examples would be multi-player 'battleships' or an adventure game. My interests lie more in the field of simulating competition in an economic environment.

What this (and the higher level communication possibilities) allow is a whole new approach to microcomputer use where an important element becomes interaction between different stations and their users and programs. Econet is very powerful in the degree to which it permits this interaction to be taken. It offers some exciting challenges to both hobbyist and educational users. However, its full capabilites for larger networks require the assistance of a second processor. That is where the story will continue next month when we will give space to two aspects of the second processor: its use on a single machine and its implementation of Econet.

U.K. USER GROUP SOFTWARE

The BBC Users' Group in Britain publishes its own software under the trade name Beebugsoft. This may become available in New Zealand through the New Zealand BBC Users' Group. The software produced covers a variety of utility tasks. We have recently been working with two software and two ROM-based products: Teletext editor, MasterFile, Disk Doctor, and Toolkit.

Of these, the two ROMs are exceptionally useful and well written. Disk Doctor is a ROM that allows resurrection and editing of tracks and sectors on a disk drive, while Toolkit gives access to a variety of programming aids including: global search and/or replace for strings or keywords; listings of array, function or procedure names; recovery of bad programs; sophisticated renumbering and merging; enhanced editing procedures. The ROM is fast, uses the BBC facilities well, and my only complaint is that I find its editing mode a little disorienting. Both ROMs are very professional products.

The other software is disk based. I recommend the Teletext editor heartily. Apart from being a very good means of creating and editing screens of teletext characters and graphics it also has a self-tuition program dealing with the whole concept of the teletext mode. This augments and expands anything in any manual or guide I have seen and is excellent value. Since pages produced by the editor can easily be integrated into any programs you write it is a very useful utility. Masterfile is a reasonable, elementary data-base handler. It is useful for home, clubs or limited school use. It is menu driven and very easy to use with standard, fixed-format records. However, we did find a few minor hiccoughs in its operation, none of which were terminal but all of which caused momentary consternation. This product is not really quite to the same standard as others in its class.

In all, for the cost, Beebugsoft appears to give good value for money with simple but generally effective software. However, it is not the place for sophisticated, serious software such as spreadsheet and data-base programs. It is hoped to review options in these areas over the next few months starting with the companion spreadsheet to View, Viewsheet.

Speeding up tape storage

By Gordon Findlay

In the April issue I wrote a little about saving data on tape. By coincidence I received a tape from Alistair Symes with a program which used a machine-code routine to speed tape storage. Alistair's program is used to store screens of information on tape. What follows is Alistair Symes's explanation of his routine, and a BASIC program which uses it.

Alistair also has a hardware interface and BASIC program which he uses to send and receive Morse code using a System 80. If you are interested in this you could write to him at 5 Gilwell Street, Christchurch 6.

Here is his article:

"If you have a 'tape-based System 80' and wish to save screen loads of information on tape, you probably realise only too well how slow and boring this can be. Wouldn't it be more interesting if the text scrolled on to the screen while the tape is loading? Also, wouldn't it be nice to shorten the looooonnngggg leader?

"Being a novice at assembly language I decided to make this my first task and have learnt a lot about assembly language in the process. Anyway why these computers have such a long leader I'll never know. After experimenting with different leader lengths, I found 50 bytes was adequate to give time for the tape motor to start and stabilise. This is the absolute minimum. Any less and synchronisation would be difficult to establish.

"The tape read routine in ROM at 0296H reads the tape until an A5 byte is found and synchronises with the tape ready to read the text. If this isn't done sync. is lost and all sorts of interesting things appear on the screen. But I wasn't interested in random graphic displays. I have remarked the assembly listing fairly thoroughly. To the pro's this is probably fairly basic stuff. But as for me, by the time I had got the bugs out of it, my brain was running a temperature.

"I then assembled it into memory (after filling high memory with zeros to find where it started and stopped), peeked at it and listed the result. I can't seem to find a way of doing this with 'EDTASM'.

"Machine language is very fast. To give an example of how fast, there is a subroutine in ROM (235H) that calls another routine (241H) eight times to read just one byte from tape! [Each call reads one bit, and the eight bits are assembled into one byte — Ed.]

"The resulting program in 'BASIC' lets you get out a screen full of text in upper case and lower case using the keyboard like a regular typewriter (i.e. the shift key is used for capitals). The flashing cursor block is positioned with the arrow keys and large graphic blocks (CHR$(191)) can be inserted using the shifted arrow keys. When the screen is ready for recording, 'NEWLINE' is pressed, providing the tape is set to record. If all is well the screen will be dumped to tape with only a 50 byte leader and no stops. It is amazing just how much text you can store on a C10 cassette.

"To read from tape the selected number is pressed and the text will scroll on to the screen almost immediately. It is very important that the tape is positioned correctly because of the small leader.

"I hope to write another small machine-language routine to give a printed copy of text in the near future.

"I hope you find this utility as useful as I have. If you have any problems with the program write to me and I will try to help you out."

ICL Videotex

The ICL Bulletin videotex system will carry a Bank of New Zealand foreign-exchange information service, which is expected to have more than 250 corporate customers. Financial directors of the customer firms will be able to access current exchange-rate information round the clock from terminals on their desks. It will also carry commentary and forecasts.

TRS80/SYSTEM 80

```
15 DIMN(64)
20 CLS:PRINT@145,"FAST STORAGE FOR TAPE
SYSTEMS":FRINT@209,STRING$(28,131);:PRINT@277,"BY A.C.D. SYMES (C)"
30 PRINT@448,"PRESS 'NEW LINE' WHEN SCREEN HAS BEEN SET OUT READY TO
RECORD";
50
FOR>=32500TO32526:READD:POKEX,D:NEXT:FORX=32530TO32567:READD:POKEX,D:
EXT
60
DATA33,0,60,1,192,3,205,10,2,205,150,2,205,33,2,119,35,11,120,177,194
0,127,205,248,1,201
70
DATA205,18,2,62,0,6,50,205,100,2,16,251,62,165,205,100,2,33,0,60,1,19
,3,126,205,100,2,35,11,120,177,194,41,127,205,248,1,201
80 GOTO610
90 IE$INKEY$=""THEN90:ELSECL$:S=15360
100
C=FEEK(S):IFS>16320THEN$=16320ELSEPOKES,143:FORX=1TO5:NEXT:POKES,C
105 A$=INKEY$:IFA$=""THEN100ELSEA=ASC(A$)
110 IFA >64ANDA <91A=A+32ELSEIFA>96A=A-32
115 IFA<>20RA=9THEN300
120 POKES,A:S=S+1:GOTO100
200 IFA=8ANDS>15360THENS=S-1:GOTO500
310 IFA=9ANDS<16383THENS=S+1:GOTO500
320 IFA=91ANDS>15423THENS=S-64:GOTO500
330 IFA=10ANDS<16256THENS=S+64:GOTO500
335 IFA=1THEN90
340 IFA=26A=191:GOTO120
350 IFA=24ANDS>15340POKES,191:S=S-1:GOTO100
360 IFA=25ANDS<15423POKES,191:S=S-64:GOTO100
370 IFA=26ANDS<16319POKES,191:S=S+64:GOTO100
380 IFA=12THEN600
400 GOTO100
500 C=FEEK(S):IFS>16320THENS=16320
502 IFFEEK(15359)=0THEN100
505 FORX=1TO3:NEXT:POKES,C
510 GOTO115
600
610 PRINT@960,"1. TYPE TO SCREEN --- 2. LOAD FROM TAPE --- 3. LOAD TO
TAPE":
700 A$=INKEY$:IFA$=""THEN700ELSEA=ASC(A$)
710 IFA=1THENPOKE16526,18:POKE16527,127:X=USR(0):GOTO610
720 IEA=4:THEN90
800 IEA=50THENPRINT@960,"PREPARE TAPE AND PRESS 1. TO LOAD --- OR ---
2. TO CANCEL      ";
810
A$=INKEY$:IFA$=""THEN810ELSEIFA$="1"THENCLS:POKE16526,244:POKE16527,1
6:X=USR(0):GOTO610
820 IFA$="2"THEN610ELSE800
Basic program for storing information by screen.
```

```
00090 ;-----------------------------------------
00091 ;;   TAPE READ / WRITE ROUTINE BY A. SYMES    :
00092 ;;   FOR BASIC POKE 16526,244:POKE16527,126   :
00093 ;;   TO ACCESS THE READ ROUTINE AND           :
00094 ;;   POKE16526,18:POKE16527,127 FOR THE       :
00095 ;;   WRITE ROUTINE.   MEM SIZE? 32500.        :
00096 ;-----------------------------------------
00097 ;
00098 ;
00099 ;
00100 GETBYT EQU   0235H;ROUTINE TO READ BYTE FROM TAPE
00120 RDRON  EQU   0212H;TURN ON RECORDER MOTOR
00130 RDROFF EQU   01F8H;TURN OFF RECORDER MOTOR
00140 RDTAPE EQU   0296H;READ TAPE UNTIL A5 BYTE FOUND
00150 CLS    EQU   01C9H;CLEAR SCREEN
00170 WRTBYT EQU   0264H;ROUTINE TO WRITE 'A' TO TAPE
00220        ORG   32500
00230 READ   LD    HL,3C00H ;START OF SCREEN
00231        LD    BC,960;NUMBER OF BYTES TO READ
00235        CALL  RDRON;TURN ON RECORDER
00240        CALL  RDTAPE;READ UNTIL 'A5' FOUND
00250 LOOP2  CALL  GETBYT;READ BYTE FROM TAPE
00260        LD    (HL),A;PUT BYTE TO SCREEN
00270        INC   HL;BUMP SCREEN POS
00280        DEC   BC;UNBUMP COUNT
00290        LD    A,B;CHECK - IS BC
00300        OR    C;ZERO YET?
00310        JP    NZ,LOOP2 ;IF NOT ZERO GO BACK
00320        CALL  RDROFF;ALL DONE, TURN OFF RECORDER
00330        RET   ;RETURN TO BASIC
00640        ORG   32530
00650 WRITE  CALL  RDRON;TURN ON RECORDER
00660        LD    A,00H;LOAD 'A' WITH ZERO
00670        LD    B,50;LEADER OR 50 BYTES
00680 WB     CALL  WRTBYT;WRITE 'A' TO TAPE
00690        DJNZ  WB;DEC B UNTIL DONE
00700        LD    A,0A5H;LOAD A WITH A5 SYNC BYTE
00710        CALL  WRTBYT;WRITE IT
00720        LD    HL,3C00H ;START AT BEGINNING OF SCREEN
00730        LD    BC,960;NO. OF SCREEN POSITIONS TO WRITE
00740 RITE1  LD    A,(HL);LOAD A WITH CONTENCE OF SCREEN
00750        CALL  WRTBYT;WRITE 'A' TO TAPE
00760        INC   HL;BUMP HL
00770        DEC   BC;UNBUMP COUNTER
00780        LD    A,B;CHECK - IS BC
00790        OR    C;ZERO YET?
00800        JP    NZ,RITE1 ;IF NOT ZERO GO BACK
00810        CALL  RDROFF;TURN OFF RECORDER
00820        RET   ;RETURN TO BASIC
00830        END
```

BOOKS

Good stuff, good shape

"Get More from the VIC 20" by Owen Bishop, Granada, 185pp, $19.95. Reviewed by Steven Darnold.

Owen Bishop knows a lot about the VIC, and he writes very well. He provides a wealth of useful information in a lively, lucid style in a book which would be a worthwhile acquisition for anyone wanting to delve deeply into the mysteries of the VIC.

The first two chapters start right at the beginning with a description of how to set up the computer. This is followed by a thorough tour of the keyboard. Although most users will not require such a detailed explanation of the basics, this does make the book suitable for even the most rank beginner.

The third chapter plunges swiftly into programming by introducing the POKE statement and using it to build some simple, colourful programs. Thereafter, new statements and commands are introduced gradually and used in simple programs, many of which involve some interesting graphics or sound.

The latter half of the book deals with advanced techniques of graphics and sound. This includes animation and sound envelopes. Even fairly experienced VIC users will find much to learn from this section.

"Get More from the VIC 20" is a very demanding book and will not suit the more pedestrian user. However, for those who want to fully explore the capabilities of the VIC, it is ideal.

Not to be missed

"How to use the Timex-Sinclair Computer" by Jerry Willis and Deborah Willis, dilithium Press, 124pp, $9.50. Reviewed by Euan J. Davidson.

Jerry and Deborah Willis, who have a long association with the Timex-Sinclair computer (as the Sinclair ZX-81 is known as in U.S.A.), have written a book that is a must for anyone who has just obtained a ZX-81.

They take the reader through from the bits and pieces that come with the unit to add-on accessories which are unfortunately available in U.S.A. but not here.

In a very easy-to-follow style, they clearly explain how to set up the ZX-81 as you unpack it, and how to LOAD and SAVE programs using an audio-cassette recorder. They go to great lengths to cover all the likely problems.

Excellent details of the Sinclair 8asic are covered in chapters entitled "Basic" and "More Basic" where related keywords and functions have been gathered together (e.g. PRINT, AT, the comma, semi-colon and Tab) for discussion and comparison.

Many short programs are used to illustrate the text throughout the 124 pages. Some of the programs later in the book are described in great detail for the benefit of the beginner.

This simply written, easily understandable and logically planned book should be the very first for the new, inexperienced ZX-81 owner. And at only $9.50, it is most affordable.

Right on target

"The IBM PC-DOS Handbook" by Richard Allen King — Sybex, 296pp, $21.95. Reviewed by Paul Cull.

This book is divided into two main parts. The first, chapters one to eight shows how the assembly language programmer can use the DOS functions available. The second section covers PC-DOS from the advanced user's point of view, discussing the less often used commands and utilities. A chapter of tables and maps, and an appendix comparing PC-DOS with MS-DOS,

completes the book.

Section one describes in detail the various DOS and BIOS functions available to the programmer. Versions 1.0, 1.1, and 2.0, are discussed and compared throughout. Function calls covered include file, screen, and keyboard handling, from DOS and BIOS. Handling the parallel printer and serial ACA (RS.232) ports, is also described in detail. Other topics include disk organisation, graphics handling, and the new DOS 2.0 features.

The second section describes the less common DOS commands, and is intended for the advanced user. Topics covered include EDLIN (described as a "funny little editor"), DEBUG — and batch files. The serial port is discussed in a separate chapter, as is DOS 2.0.

Other interesting "bits and pieces" covered, include editing DOS command lines, finding your way around IBM's PC-DOS manuals, and responding to disk errors. The "tables and maps" chapter summarises such things as DOS, EDLIN, and DEBUG commands, DOS function calls and memory maps, to name a few.

This book fulfils its intended purpose as an information reference manual. It is well presented and useful, and I recommend it to anyone writing assembler programs for the PC as well as to those users who want to know more about the features of PC-DOS.

Don't let the title fool you

"Troubleshooting and Repairing Personal Computers" by Art Margolis. TAB Books, 312pp, $31.95. Reviewed by Ted Brown.

This weighty book of 21 chapters, has a misleading title. It would be better described as an overview of the chips and circuitry of small personal computers. It gives a very good account of each chip and its internal workings, then shows how it ties in with the other chips in the computer.

The book has been slanted at television and general electronic servicemen — and with the type of knowledge they have acquired over the years, would be very useful for them. For ordinary home computer owners, its value is in describing fairly thoroughly how everything works.

I take marked exception to the blurb on the back cover that says it will show you how to repair all computers from ZX81 to IBM PC; from TSL000 to Commodore 64. The only example used throughout the whole book is the TRS-80 Colour Computer and right at the very end, the Zenith Monitor. For owners of the Tandy Colour Computer it would be very useful — indeed, a wise investment.

The author has a very good knowledge of servicing and assumes others have the same intuitive feel for fault finding. I'm afraid the average computer owner doesn't have so much of this and needs more guidance than given in this book.

In the book reviewed, pages 217 to 248 were duplicated — after coming to page 248 one comes across 217 to 248 again. This apart, the book is very informative, but not from the viewpoint of the title.

A low key approach to music

By Gary Parker

The Spectrum has an inbuilt speaker which can produce musical notes, but it is seldom used to its full potential. This is probably because the volume is poor, and tunes are not easy to program.

Why is the Spectrum's speaker so quiet? I think the Oric computer may provide the answer. The Oric has an inbuilt speaker like the Spectrum, except that the volume is much higher. It sounds much better when the computer is playing music, but when other computations are going on, the speaker buzzes and squeaks. This is because the speaker picks up interference from the rest of the computer. So perhaps Sinclair decided to avoid this problem by reducing the volume.

To appreciate Spectrum sound more fully, you should plug the mic lead from the computer into the ear lead of your cassette recorder. With most recorders, the sound will be amplified if you start the recorder playing, but make sure that you don't leave a tape in it.

If you want to hear some really impressive sound from your Spectrum, you should connect it to a stereo. The larger speakers will give a far better base response, changing tinny pings into throaty booms. Try it, the improvement really is amazing.

Tunes are not particularly easy to program because notes must be represented as numbers, and this involves some tedious conversions. The Spectrum uses a system whereby each of the 12 semi-tones in an octave is represented by an integer number, with 0 being middle C. Written music is not easy to convert to this system, especially when more than a few notes are involved.

Here are some examples:

a will play the A which is two notes below middle C.
d will play the D which is one note above middle C.
c+1 will play the C which is one octave higher than middle C.
d#−2 will play the D sharp which is two octaves below middle C.

Do not worry too much about which octave you enter the tune in, since it is easy to change the scale of the whole tune later.

The note may also be a p, in which case there will be silence for the duration specified.

Once you have entered your tune, press q instead of a number for the duration, and the tune will begin to play. While it is playing, you can press t to change the tempo (the length of the notes), or g to change the length of the gaps between the notes, or s to change the scale of the tune, (for instance, −1 will lower the tune an octave), or a to add more notes to the end of the tune.

The notes are stored in a three-dimensional string array, and you can save the tune with the program, by breaking into the program and using SAVE "tune" LINE 100. Then you can continue with GOTO 100.

The program is set to allow up to 500 notes to be stored, but on a 48K Spectrum you can store over 4000 notes by changing the DIM statement in line 290 from 500 to 4000 or so. However, the bigger the array, the longer it takes to save, so don't declare a huge array which you will never fill.

```
  1 REM SPECTRUM MUSIC-MAKER
 10 GO TO 290
 80 LET lim=c: LET c=0: LET met
=1: LET gap=0: LET sc=0: LET ofs
=0
 90 CLS
 100 LET c=c+1: IF c>=lim THEN L
ET c=1: PRINT PAPER RND*5+1," ";
: POKE 23692,255
 102 IF IN 65022=189 THEN INPUT
"Change scale from ";(sc);" to ?
";sc: LET ofs=12*sc
 103 IF IN 65022=190 THEN LET c=
lim-1: CLS : GO TO 300
 105 IF IN 64510=175 THEN INPUT
"Change tempo from ";(met);" to
? ";met
 107 IF IN 65022=175 THEN INPUT
"Change gaps from ";(gap);" to ?
";gap
 109 FOR k=1 TO gap: NEXT k
 110 LET length=VAL a$(c,1,1 TO
)*met
 120 LET n$=a$(c,2,1 TO )
 130 LET c$=n$(1)
 140 LET note=-3*(c$="a")-(c$="b
")+2*(c$="d")+4*(c$="e")+5*(c$="
f")+7*(c$="g")
 200 IF c$="p" THEN FOR k=1 TO l
ength*150: NEXT k: GO TO 100
 210 IF n$(2)="#" THEN LET note=
note+1
 220 IF n$(2)="+" THEN LET note=
note+(VAL n$(3)*12)
 225 IF n$(3)="+" THEN LET note=
note+(VAL n$(4)*12)
 230 IF n$(2)="-" THEN LET note=
note-(VAL n$(3)*12)
 235 IF n$(3)="-" THEN LET note=
note-(VAL n$(4)*12)
 250 LET note=note+ofs
 260 BEEP length,note
 270 GO TO 100
 290 DIM c$(1): DIM b$(3): DIM a
$(500,2,4): LET c=0
 300 LET c=c+1
 310 INPUT "Duration:";b$
 312 IF b$(1)="q" THEN LET a$(c,
1)="q": GO TO 320
 315 LET a$(c,1)=STR$ (VAL b$/10
0)
 320 PRINT b$(1 TO 3),
 330 IF b$(1)="q" THEN GO TO 80
 340 INPUT "Note:";a$(c,2)
 350 PRINT a$(c,2,1 TO )
 360 INPUT INKEY$="y"
 365 IF a$(c,2,1)="q" THEN GO TO
 80
 370 GO TO 300
```

GLOSSARY

Acoustic coupler: Connects the RS232 part of a microcomputer to a telephone handpiece.

Algorithm: A list of instructions for carrying out some process step by step.

Applications program: A program written to carry out a specific job, for example an accounting or word processing program.

Array: A data type found in high level languages, which is stored in a contiguous block of memory. Accessed by the array name and an index making it easier to process groups of data in many situations.

ASCII: American Standard Code for Information Interchange. An 8-bit code.

BASIC: Beginners' All-purpose Symbolic Instruction Code. The most widely used, and easiest to learn, high level programming language for microcomputers.

Baud: Speed of transferring data, measured in bits per second.

Bidirectional: A printer that prints when moving left as well as when moving right.

Binary: The system of counting in 1's and 0's used by all digital computers. The 1's and 0's are represented in the computer by electrical pulses, either on or off.

Bit: Binary digit. Each bit represents a character in a binary number, that is either a 1 or 0. The number 2 equals 10 in binary and is two bits.

Boot: To load the operating system into the computer from a disk or tape. Usually one of the first steps in preparing the computer for use.

Bubble memory: A non-volatile memory (i.e., it is not erased when the power is turned off). The information is stored as microscopic pieces of magnetic polarisation.

Buffer: An area of memory used for temporary storage while transferring data to or from a peripheral such as a printer or a disk drive.

Bug: An error in a program.

Byte: Eight bits. A letter or number is usually represented in a computer by a series of eight bits called a byte and the computer handles these as one unit or "word".

CAL: Computer Aided Learning. CAL programs are written to take different actions on different student answers.

CMOS: Transistor technology — when a pair of transistors of opposite type are used together. Means low power use.

Computer language: Any group of letters, numbers, symbols and punctuation marks that enable a user to instruct or communicate with a computer.

Courseware: Name for computer programs used in teaching applications.

cpi: Means character per inch. A common way of describing character density, i.e., how close together characters are in printers.

CP/M: An operating system for Z80 based machines. It is by far the most widely used DOS for Z80 based machines and there is an extremely large software base for it. See also disk operating systems.

cps: Characters per second. A common way of describing speed in printers.

Cursor: A mark on a video that indicates where the next character will be shown, or where a change can next be made.

Daisywheel printer: A printer in which the letters are formed by impact of a letter on a disk rotated until the required character is in position. Daisywheel printing is close to traditional typing in appearance.

Data: Any information used by the computer either I/O or internal information. All internal information is represented in binary.

DC: Direct coupling (telecommunngl; or direct current.

Disk: A flat, circular magnetic surface on which the computer can store and retrieve data and programs. A flexible or floppy disk is a single 8 inch or 5¼ inch disk of flexible plastic enclosed in an envelope. A hard disk is an assembly of several disks of hard plastic material, mounted one above another on the same spindle. The hard disk holds up to hundreds of millions of bytes – while floppy disks typically hold between 140,000 and three million bytes.

Disk drive: The mechanical device which rotates the disk and positions the read/write head so information can be retrieved or sent to the disk by the computer.

Diskette: Another name for a 5¼ inch floppy disk.

Disk operating system: A set of programs that operate and control one or more disk drives. See CP/M for one example. Other examples are TRSDOS (on TRS 80) and DOS 3.3 (for Apples).

DOS: See disk operating system.

Dot matrix: A type of print head, made up of a matrix of pins, e.g. 8x8. When a character is to be printed the appropriate pins push out and strike the ribbon to paper forming the character.

Dot graphics: These graphics are individual screen pixels. Used by either turning on or off one pixel.

Double-density: Floppy drives that store twice the standard amount of data in the same space.

Dump: Popular term for sending data from a computer to a mass storage device such as disks or tape.

EPROM: Erasable, user-programmable, read-only memory.

Execute: A command that tells a computer to carry out a user's instructions or program.

File: A continuous collection of characters (or bytes) that the user considers a unit (for example on accounts receivable file), stored on a tape or disk for later use.

Floppies: Thin plastic disks with a magnetic coating used for storing information. Called floppies because they are flexible.

FORTH: A compact language. The programmer extends the language as he programs.

Friction feed: A type of paper-feeding system for printers: normal paper in a continuous sheet is gripped between two friction rollers as on a typewriter.

Hardware: The computer itself and peripheral machines for storing, reading in and printing out information.

Hex: Abbreviation for hexadecimal notation, a base-16 numbering system convenient to use with computers.

High-level language: Any English-like language, such as BASIC, that provides easier use for untrained programmers.

IEEE: A standardisation based on the Institute of Electrical and Electronics Engineers.

Ink-jet printer: These printers form images by spraying droplets of ink on to paper. Each droplet is electrically charged and is deflected into the required position by magnetic plates.

Input: Any kind of information that one enters into a computer.

Interactive: Refers to the "conversation" or communication between a computer and the operator.

Interface: Any hardware/software system that links a microcomputer and any other device.

I/O "Input/output".

Inverse video: When the background is coloured; e.g. on a black and white screen white becomes background and characters are written in black.

K: The number 1024. Commonly refers to 1024 bytes. Main exception is capacity of individual chips, where K means 1024 bits.

Kilobyte (or K): Represents 1024 bytes. For example 5K is 5120 bytes (5 x 1024).

LAN: Local area network. A communications network linking a number of stations in the same "local" area — usually a building or the area within a radius of a kilometre.

LCD: Liquid-crystal display.

Line feed: A control code character found in the ASCII character set. Its normal purpose is to move the cursor down one line (on screen) or move paper up one line (on printer). Does not return the cursor to the left-hand margin.

Logic seeking: In such a printer, the head-control microprocessor works out the shortest distance to travel to the start of the next line.

Machine language: The binary code language that a computer can directly "understand".

Mainframe: The very large computers that banks and other large businesses use are called mainframes. Also in microcomputers the term is sometimes used to describe the core of the machine, i.e. the CPU plus memory.

Mass storage: A place in which large amounts of information are stored, such as a cassette tape or floppy disk.

Megabyte (or Mb): Represents a million bytes.

Memory: The part of the microcomputer that stores information and instructions. Each piece of information or instruction has a unique location assigned to it within a memory. There is internal memory inside the microcomputer itself, and external memory stored on a peripheral device such as disks or tape.

Memory capacity: Amount of available storage space, in Kbytes.

Menu: List of options within a program that allows the operator to choose which part to interact with (see interactive). The options are displayed on a screen and the operator chooses one. Menus allow user to easily and quickly get into programs without knowing any technical methods.

Microcomputer: A small computer based on a microprocessor.

Microprocessor: The central processing unit or "intelligent" part of a microcomputer. It is contained on a single chip of silicon and controls all the functions and calculations.

Minicomputer: Originally a computer that went with a single equipment cabinet. Now a computer between a microcomputer and a mainframe. Note that the boundaries between mini's and the classes on either side of it are unclear.

Modem: Modulator-demodulator. An instrument that connects a microcomputer to a telephone and allows it to communicate with another computer over the telephone lines.

Network: An interconnected group of computers or terminals linked together for specific communications.

Output: The information a computer displays, prints or transmits after it has processed the input. See input and I/O.

Parallel interface: A type of communications interface used mostly for printers. It sends a whole character of data down eight (commonly) lines, one bit down each line. The most common type of parallel interface for printers is the Centronics interface.

Pascal: A high-level language that may eventually rival BASIC in popularity. It incorporates the form of structured programmes.

PEEK: A command that examines a specific memory location and gives the operator the value there.

Peripherals: All external input or output devices: printer, terminal, drives etc.

Pinfeed: (also called sproket feed). A method of paper feed in printers using sprockets.

PIPS: Pan Information Processing System. An information-processing package that runs on Sord computers.

Pixel: Picture element. The point on a screen in graphics.

Plotter: An output device for translating information from a computer into pictorial or graphical form on paper or a similar medium.

POKE: A command that inserts e value into e specific memory location.

Program: A set or collection of instructions written in a particular programming language that causes a computer to carry out or execute a given operation.

RAM: Random access memory is the very fast memory inside your computer. The access time for any piece is the same. Your program and run-time data are usually stored in RAM.

Raster graphics: In this method, images are built up by a succession of parallel movements of the spot on the terminal, in a similar manner to a television picture. That is, each line is not traced as a continuous movement.

REM statement: A remark statement in BASIC. It serves as a memo to programmers, and plays no part in the running program.

Resolution: A measure of the number of points (pixels) on a computer screen.

ROM: Read only memory. Any memory in which information or instructions have been permanently fixed.

Serial interface: A type of communications interface used for a wide variety of purposes (printers, terminals, telephone connection etc.). It uses a minimum of two wires, and sends the data one bit at a time down one wire. The most common type of serial interface is RS232C.

Sheet feed: A type of paper feeding system normally used for high-quality document printers. A special device picks up a sheet of paper and feeds it into friction rollers.

Software: Any programs used to operate a computer.

Spooling: This is when a microcomputer can proceed with other tasks while output is printed from a buffer in the printer. An acronym for simultaneous peripheral output on line.

Sprocket feed: See pin feed.

Structured programming: An approach to program writing that puts emphasis on over-all program design, readability, and other features.

System: A collection of hardware and software where the whole is greater than the sum of the parts.

Tractor feed: A type of paper feeding system for printers. Special computer paper with holes along both sides is fed by the tractors gripping these holes.

VDU: Visual display unit. A device that shows computer output on a television screen.

Word: A group of bits that are processed together by the computer. Most microcomputers use eight or 16 bit words.

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Advertiser Index

COMMODORE 64

From page 62

are interested in this sort of game, I suggest you start with Dark Dungeons. It is slightly less tedious.

Dicky's Diamonds

I liked this game right from the beginning. It has marvellous theme music, good graphics, and several playing options. Not only is there a place for nine names on the high score table, the table can be saved on tape and reloaded later. A lot of thought has gone into the presentation of Dicky's Diamonds.

So much for the good news. The bad news is that the average person will find it almost impossible to succeed at Dicky's Diamonds. The main problem is that the goal of the game is very hard to understand. The written rules do their best to explain the game, but until you actually win for the first time, you don't really understand what's going on.

To make matters worse, the game's default options produce a rather difficult game. Beginners haven't a hope unless they choose the "unlimited flights" option. The author really should have used "unlimited flights" as his default. Moreover, he should have designed his demo game to show a winning move; that way beginners would have a better idea of what to do.

A further problem arises because of the nature of joysticks. Dicky's Diamonds is played on a spider's web, and there is a lot of movement along the diagonals. Unfortunately, diagonals do not register as reliably on a joystick as the four cardinal directions.

Joysticks have only four switches (for the cardinal directions), and the diagonals depend on two switches being set. If the joystick does not hit both switches at precisely the same instant, the diagonal may be missed. This is very important in Dicky's Diamonds because once you start down a particular strand of the web, you can't turn back. It is very easy to miss a diagonal and end up moving a considerable distance down the wrong track.

Fortunately you can avoid this problem by using the keyboard option instead of the joystick. However, I found the keys awkward to use and soon switched back to the joystick.

Dicky's Diamonds is a nicely polished program, but most people will find it difficult to learn and awkward to play.

The winner of April's competition was Linton Miller of Thames. Linton has been sent a copy of Kong (donated by Alpine Computing).

The prize for this month's competition is a cassette tape of Galaxy (donated by Alpine Computing). Entries close on June 25. The winner will be selected randomly from among the correct entries. Only one entry per person.

Your task this month is to write a program which uses two multi-colour sprites, side-by-side to display the New Zealand flag in the middle of the screen. Send the program with your name and address to Galaxy Contest, P.O. Box 201, Alexandra.

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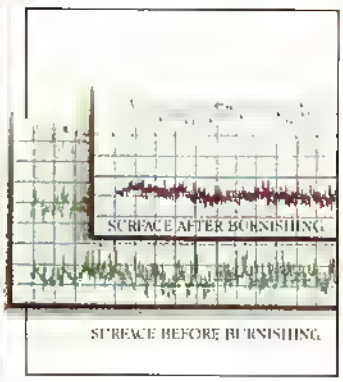

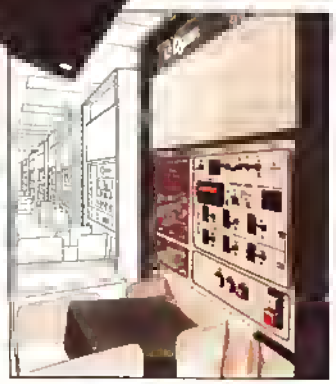

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